A SHORT

INTRODUCTION

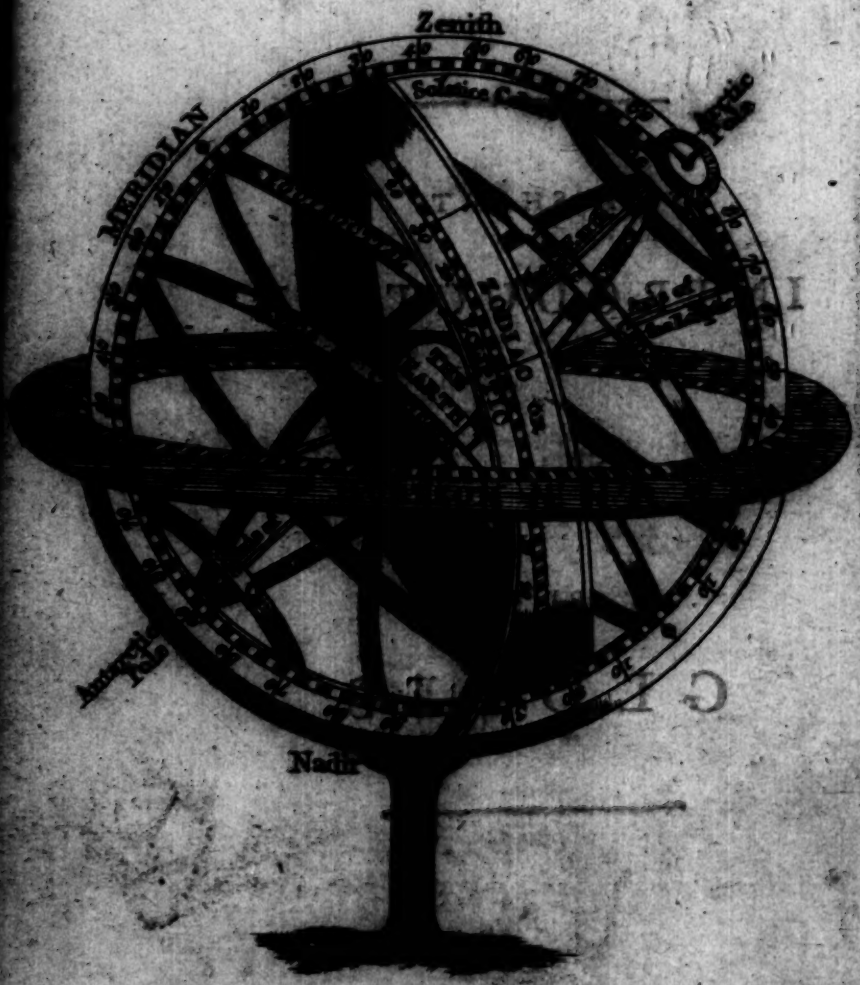
TO

THE USE

OF THE

GLOBES.

The Armillary Sphere.



A SHORT INTRODUCTION TO *THE USE* OF THE *GLOBES*;

CONTAINING

AN EXPLANATION OF THE PRINCIPAL TERMS AND RULES FOR THE SOLUTION OF THE

MOST USEFUL PROBLEMS

WITH A VARIETY OF

EXAMPLES

INTENDED FOR THE LEARNER'S EXERCISE

A NEW EDITION ENLARGED

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N. B. *The ſpaces left after the words lat ? long ? at page 64, &c. are to be filled up by the Student from ſome good Maps.*

PREFACE.

AS the Plan of the following Work is entirely different from that of any other Treatiſe on the ſame Subject, and is peculiarly calculated to leſſen the Labour of the Maſter; any Apology for its Publication would, it is preſumed, be deemed ſuperfluous.—By putting this Short Introduction into the Hands of his Pupils, the Maſter will be enabled to inſtruct them in this neceſſary Branch of Education, without wholly confining himſelf to that particular Claſs. For a few of the introductory Lectures, indeed, more of his Aſſiſtance will neceſſarily be requiſite, in order to point out the different Lines and Circles on the Terreſtrial

Globe,

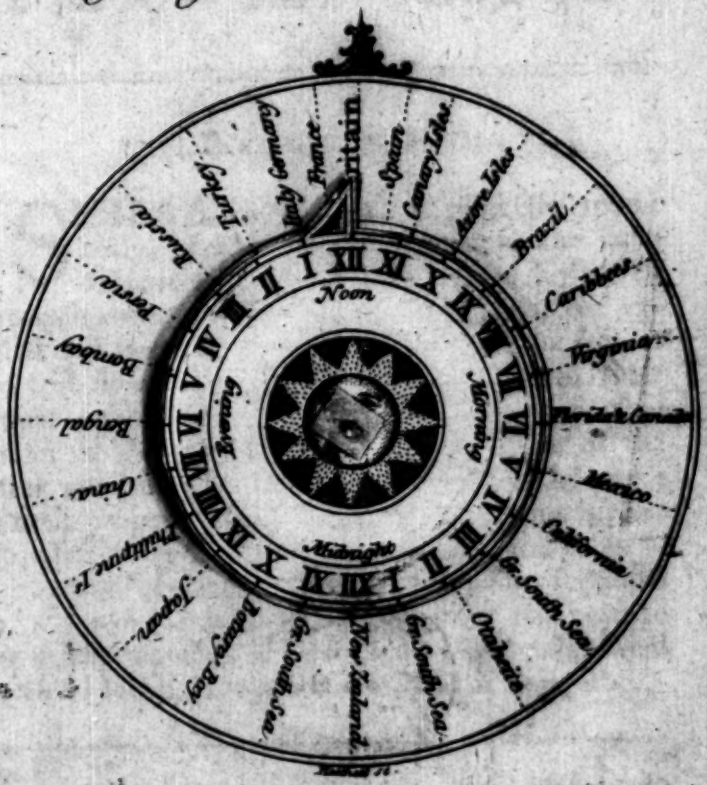
Globe, as well as thoſe which are common to both Globes; and to ſhew the Parts, which correſpond to them, in a General Map of the World. Afterwards, a brief Explanation of the Subject of each Problem, and the Performance of the firſt Example, will commonly be ſufficient to enable the Learner to anſwer the reſt himſelf, without any farther Directions from the Maſter.

The Problems may occaſionally be diverſified, by reading ſuitable Extracts, from any of the popular Writers on Geography and Aſtronomy; particularly Dr. BERKENHOUT and Mr. BONNYCASTLE, whoſe elegant Letters on theſe Subjects are equally inſtructive and entertaining.

MACCLESFIELD-SCHOOL,
March 13, 1793.

THE

A Geographical Clock.



Placing at Great Britain *the figures expressing any Hour of the Day or Night, as represented on the small moveable circle, will shew the exact time it either then is, or will be by that period at the various parts of the world mentioned on the larger fixt circle.*

THE

USE OF THE GLOBES.

EXPLANATION OF TERMS.

1. SPHERE, or GLOBE, a perfectly round body, of which the center is at the ſame diſtance from every point of the ſurface or circumference. Globes are of two kinds, the celeſtial and terreſtrial; on the ſurface of the former are laid down the fixed ſtars, diſpoſed into their proper conſtellations, together with the principal circles of the ſphere; and on the ſurface of the latter are drawn the principal places of the earth in their proper ſituations, and the different circles ſuppoſed to be drawn on the ſurface of the earth *.

2. AXIS of the earth, an imaginary line, ſuppoſed to be drawn through the center from one pole to the other, repreſented by the wire which paſſes from north to ſouth, through the middle of the globe.

* Of globes there are various ſizes, diſtinguiſhed by the length of their diameters; the moſt convenient are thoſe of 12 inches, price three guineas, mounted in the common manner, or five guineas in neat mahogany claw-feet frames. The ſmalleſt ſize is 3 inches, in caps, at nine ſhillings each; and the largeſt for ſale, 28 inches, price fifty pounds. The intermediate ſizes, excluſive of thoſe already mentioned, are 9 inches, price two guineas, and 17 inches, price ſix guineas, mounted in the common manner.——There are two unequal diameters of the earth, the polar and equatorial, the latter exceeding the former about 34 miles; but in globes theſe diameters are made exactly equal.

3. Poles of the world, those two points which are at the extremities of the earth's axis; or, when referred to the heavens, the two points directly over them: of which one is called the Arctic or North pole, and the other the Antarctic or South pole.

4. Brazen Meridian, a brass circle in which the globe revolves. It is divided into 360 parts, called degrees, and cuts the horizon at right angles in the north and south points. The degrees in the upper semicircle of the meridian are numbered both ways from the equator towards the poles; but the degrees in the lower semicircle of the meridian are numbered from the poles towards the equator.—The latitudes of places are found by the former, and the poles are elevated, any number of degrees, by means of the latter.

5. Degree, the 360th part of the circumference of the globe, and contains 60 geographical or 69½ English statute miles.

6. Hour Circle, a small brass circle fixed round the north pole, and attached to the brazen meridian. It is divided into 24 equal parts, corresponding to the hours in a day. The upper XII answers to noon, and the lower XII to midnight.

7. Index, a moveable pointer fixed at the north pole, which is the center of the hour circle.

8. Wooden Horizon, a broad wooden frame, in which the globe stands. The four concentric circles described upon its upper surface contain, A calendar of the months and days in a year,—The signs of the ecliptic,—The points of the mariner's compass,—And the degrees of amplitude, numbered from the east and west points of the horizon towards the north and south. On the horizon of some globes there is a fifth circle, containing the degrees of azimuth, numbered from the north and south points of the horizon, towards the east and west.

9. Ra-

9. RATIONAL (or true) HORIZON, a great circle which divides the globe into two equal parts, and is represented by the wooden horizon, whose two poles are the zenith and nadir.

10. SENSIBLE (or apparent) HORIZON, a small circle which separates the visible from the invisible part of the globe, or that which, owing to the convexity of the earth, and the irregularity of its surface, terminates our view, generally at the distance of a very few miles.

11. CARDINAL POINTS, the east, west, north, and south points of the compass.

12. SUBDIVISIONS of the compass.——Each quarter of the mariner's compass is divided into eight points; making up, all together, thirty-two points, which are read entirely round, from the north towards the right-hand.

13. FLOWER-*de-Luce* ✠, an ornament inserted in maps, which always points towards the north, and regulates the situation of all the other points *.

14. EQUATOR, a great circle in the middle of the globe, which is drawn breadth-ways, from west

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* In every map representing a quarter of the world, or some smaller division of it, as a particular kingdom or state, one side of the map is east, another west, a third north, and a fourth south, these terms not being *absolute*, but only *relative*: at the same time there may be only one species of latitude, and one of longitude; as, for instance, in the map of Ireland. (*I refer to the maps which accompany the quarto edition of Guthrie's Geographical Grammar.*) Here, all the places have north latitude and west longitude.——In the general map of Africa, the latitude is of both kinds, and also the longitude. In this map, it may be farther observed, there is a certain place which has neither latitude nor longitude; all places under the equator have no latitude, those under the meridian of London, no longitude; the point of intersection, therefore, has neither latitude nor longitude.

to eaſt, and on which are marked the degrees of longitude. This circle, being referred to the heavens, is called the EQUINOCTIAL.

15. ECLIPTIC, a great circle in the middle of the zodiac, which repreſents the ſun's annual courſe, and cuts the equator obliquely, in two oppoſite points. It is divided into twelve

16. SIGNS, or conſtellations of the zodiac, each thirty degrees, Aries ♈, Taurus ♉, Gemini ♊, Cancer ♋, Leo ♌, Virgo ♍, Libra ♎, Scorpio ♏, Sagittarius ♐, Capricornus ♑, Aquarius ♒, Piſces ♓.

The Cardinal points of the Ecliptic are the firſt points of the ſigns Aries, Cancer, Libra and Capricorn.

17. NORTHERN and SOUTHERN ſigns. The ſigns which are above the equator, namely, Aries, Taurus, Gemini, Cancer, Leo and Virgo, are called northern ſigns; thoſe below, namely, Libra, Scorpio, Sagittarius, Capricornus, Aquarius and Piſces, are called ſouthern ſigns.

18. SPRING, SUMMER, AUTUMNAL and WINTER ſigns. They are divided, in regard to the four quarters of the year, into ſpring, ſummer, autumnal and winter ſigns. The ſpring quarter begins on the 20th of March, when the ſun enters Aries, and contains Aries, Taurus and Gemini. The ſummer quarter begins on the 21ſt of June, which is our longeſt day, when the ſun enters Cancer, and contains Cancer, Leo and Virgo. The autumnal quarter commences on the 23d of September, when the ſun enters Libra, and contains Libra, Scorpio and Sagittarius. The winter quarter commences on the 21ſt of December, which is our ſhorteſt day, when the ſun enters Capricornus, and contains Capricornus, Aquarius and Piſces.

19. ASCENDING and DESCENDING ſigns. In

respect to the apparent direction of the sun's path, they are divided into ascending and descending signs. The ascending signs are Capricornus, Aquarius, Piscès, Aries, Taurus and Gemini; the descending, Cancer, Leo, Virgo, Libra, Scorpio and Sagittarius.

20. EQUINOCTIAL POINTS, are Aries and Libra, where the ecliptic cuts the equator; when the sun is in either of these points, the days and nights, in every part of the globe, are equal to each other. The first point of Aries is called the vernal equinox, and the beginning of Libra the autumnal equinox.

21. SOLSTITIAL POINTS, are Cancer and Capricorn, when the days and nights are most unequal. In the northern hemisphere the summer solstice is when the sun enters Cancer, and the winter solstice, when he arrives at Capricorn *.

22. HEMISPHERE. Every great circle divides the surface of the globe, or sphere, into two equal parts, each of which is termed a hemisphere. The horizon divides the UPPER from the LOWER hemisphere.—The equator or equinoctial line, called by mariners, emphatically, THE LINE, separates the NORTHERN from the SOUTHERN hemisphere; and the meridian divides the EASTERN from the WESTERN hemisphere.

23. MERIDIANS, or lines of longitude, are those circles of the globe, which, cutting the equator at right angles, converge towards the north and south poles, where they at last terminate.

24. FIRST MERIDIAN, is that from which geographers begin to count the longitudes of places. In English maps and globes this generally passes through London, or rather Greenwich; and, some-

* For an account of the characters of the 12 signs of the zodiac, *vide* Holmes's Geography and Astronomy, p. 240.

times, through the island of Ferro, one of the Canaries, which lies seventeen degrees, thirty-five minutes west, from the meridian of London. Others have drawn the first meridian through Teneriffe, another of the Canary isles, in which is one of the highest mountains in the world, called the pike of Teneriffe.

25. LONGITUDE of a place, is the distance of the meridian of that place, from the first meridian, reckoned in degrees, minutes, &c. on the equator. East longitude is counted towards the right hand, and west longitude towards the left.

26. PARALLELS of latitude, lesser circles drawn parallel to the equator, which shew the distances of places from the equator.

27. LATITUDE of a place, is it's distance from the equator, counted in degrees, minutes, &c. upon the general meridian, towards the north or south poles.

28. INTERMEDIATE CIRCLES, are four, namely, the two TROPICS, and the two POLAR CIRCLES. The tropic of Cancer is drawn twenty-three degrees and a half from the equator, towards the north pole, and touches the ecliptic, at the first point of Cancer. The tropic of Capricorn is drawn below the equator, twenty-three degrees and a half distant from it, towards the south pole, and touches the ecliptic, at the first point of Capricorn. The polar circles are two small circles, twenty-three degrees and a half distant from their respective poles, or sixty-six degrees and a half from the equator: that about the north pole is called the arctic circle, and the other about the south pole, the antarctic circle.

29. ZONES, are five, namely, the torrid zone, the two temperate zones, and the two frigid zones. The torrid zone is situated in the middle of the globe between the two tropics. It's breadth is forty-seven degrees. The north temperate zone is that part of

the

the earth which lies between the tropic of Cancer and the arctic circle, and contains in breadth forty-three degrees. The south temperate zone extends from the tropic of Capricorn to the antarctic circle. It's breadth is forty-three degrees. The north frigid zone is bounded by the arctic circle, whose radius is twenty-three degrees and a half, and center, the north pole. The south frigid zone is bounded by the antarctic circle, whose center is the south pole, and radius twenty-three degrees and a half.

30. Zenith, that point of the heavens which is perpendicularly over any place, from which a line being drawn through the center of the globe and the antipodes of the place, finds a point directly opposite to the former, called the Nadir.

31. Parallel Sphere, is that position of the globe, in which the equator coincides with the horizon, and the poles of the world are in the zenith and nadir, the parallels of latitude being parallel to the horizon.

32. Right or Direct Sphere, is that whose poles are in the horizon, and the equator and all it's parallels cut the horizon at right angles.

33. Oblique Sphere, is that position in which the equator and parallels of latitude cut the horizon obliquely; and as one of the poles is elevated above the horizon any number of degrees less than ninety, the other is equally depressed below the horizon. Hence it is very evident, that the height of the equinoctial is always equal to the complement of the latitude.

34. Climates, spaces of the earth's surface contained between two parallel circles, numbered from the equator towards the polar circles, and from thence to the poles, in which the length or duration of the longest day is half an hour, or one month, longer in the parallel which is more remote from

the equator, than in that which terminates the climate on the ſide neareſt to the equator.—For a table of climates, in the northern hemiſphere, *vide* Guthrie's *Geo. Gram.* p. 14. The number and breadths of the climates are the ſame in both hemiſpheres.

35. Antoeci, a name given to thoſe inhabitants of the earth, who live under the ſame meridian, and at equal diſtances from the equator, but on oppoſite ſides of it.

36. Perioeci, thoſe inhabitants of the earth, who live under the ſame parallel of latitude, but on oppoſite ſemicircles of the meridian.

37. Antipodes, thoſe inhabitants of the earth, who live under oppoſite parallels of latitude, and on oppoſite ſides of the meridian, and are therefore diametrically oppoſite to each other, or walk feet to feet.

38. Amphiscii, a name given to the inhabitants of the torrid zone, on account of their ſhadows falling at one time of the year towards the north, and at another time towards the ſouth. Alſo, the ſun being twice a year in their zenith, they are then called Ascii, becauſe their bodies at thoſe times caſt no ſhadow.

39. Heteroscii, a name given to the inhabitants of the temperate zones, becauſe their ſhadows at noon always fall the ſame way.

40. Periscii, the inhabitants of either of the frigid zones; ſo called becauſe their ſhadows go round them, or fall towards oppoſite points of the compaſs.

PROBLEMS

ON THE

TERRESTRIAL GLOBE.

PROBLEM I.

To find the latitude of any given place.

Turn the globe till the given place lies under the graduated ſide of the meridian, and the degree over it is the latitude, north or ſouth.

EXAMPLES.

Required the latitudes of the following places.

1. Rome.
2. Peterſburg.
3. Cairo.
4. Canton.
5. Jeruſalem.
6. Juan Fernandez.
7. Cape of G. Hope.
8. Botany-Bay.

PROBLEM II.

To find the sun's place in the ecliptic for any given day.

Find the day of the month in the calendar on the horizon, and in the adjoining circle is the sun's place; then find the same sign and degree in the ecliptic on the globe, and it is the sun's place for that day at noon.

Note. The sun's place for any given day may be more accurately found, in degrees, minutes and seconds, in the Ephemeris for the current year, under the title of the ☉'s longitude.

EXAMPLES.

Required the sun's place in the ecliptic on the following days.

1. April 10.
2. June 11.
3. August 20.
4. November 22.
5. April 25.
6. July 5.
7. November 1.
8. January 10.

PROBLEM III.

To find the ſun's declination.

Bring the ſun's place in the ecliptic to the meridian, and the degree over it is the declination required.

Note. Declination of the ſun, is it's diſtance from the equator, and is meaſured in degrees of the general meridian, north or ſouth, in the ſame manner as the latitude of any place. The anſwers to the following examples may be proved, by referring to the Ephemeris, the 5th column on the left-hand ſide.

EXAMPLES.

Required the ſun's declination on the following days.

1. March 20.
2. Auguſt 1.
3. April 30.
4. June 21.
5. September 13.
6. March 5.
7. May 16.
8. July 23.

PROBLEM IV.

To rectify the globe for any given place.

Elevate the pole so many degrees above the horizon as are equal to the latitude of the place; find the sun's place, and bring it to the meridian; set the index of the hour circle to the upper XII; and place the globe north and south by the compass, and it will then be rectified.

EXAMPLES.

1. London, March 20.	5. Canton, Sept. 13.
2. Macclesfield, Aug. 1.	6. Belgrade, March 5.
3. Port-royal, April 30.	7. Rome, May 16.
4. Petersburg, June 21.	8. Mexico, July 23.

PROBLEM V.

To find the longitude of a given place.

Bring the place to the meridian, and the degree of the equator, cut by the meridian, is the longitude east or west.

EXAMPLES.

Required the longitudes of the following places.

1. Genoa.	5. Borneo.
2. Rome.	6. Quebec.
3. Pondicherry.	7. Mexico.
4. Halifax, (*N. Scotia.*)	8. Botany-Bay.

PROBLEM

PROBLEM VI.

To find any place by the given latitude and longitude.

Bring the degree of longitude to the meridian, and under the given degree of latitude will be the place required.

EXAMPLES.

Required the places whose longitudes and latitudes are as follows.

1. 13° E. and $45\frac{1}{4}$° N.
2. $76\frac{1}{2}$° W. and 18° N.
3. $31\frac{1}{2}$° E. and 60° N.
4. $112\frac{3}{4}$° E. and $23\frac{1}{2}$° N.
5. 80° E. and 14° N.
6. 80° W. and 57° S.
7. $18\frac{1}{2}$° W. and 15° N.
8. 14° E. and 36° N.

PROBLEM VII.

To find all the places which have the ſame longitude or latitude as any given place.

Bring the given place to the meridian, then all the places which lie under the meridian have the ſame longitude; and turning the globe round its axis, all the places which paſs under the ſame degree of the meridian have the ſame latitude*.

EXAMPLES.

Required the places that have the ſame longitude as

1. Genoa.
2. York.
3. Lizard point.
4. Peterſburg.

Find what places have the ſame latitude as

5. Oporto.
6. Jamaica.
7. Stockholm.
8. Bourdeaux.

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* *Vide* Perkenhout's Letters to his Son, p. 200.

PROBLEM VIII.

To find the difference of latitude between any two given places.

Bring each of the two given places to the brazen meridian, and observe their respective latitudes; then, if both places are on the same side of the equator, subtract the less latitude from the greater, and the remainder will be the difference of latitude. But if the places are on different sides of the equator, the sum of both latitudes will be the difference of latitude required.

EXAMPLES.

Find the difference of latitude between

1. Philadelphia and Cairo.
2. Stockholm and Mexico.
3. C. Verd and C. Horn.
4. London and Botany-Bay.
5. Warsaw and Oxford Observatory*.
6. Archangel and Good Hope Town*.
7. Boston (*Lincolns.*) and Boston (*N. Eng.**)
8. London and Greenwich Observatory*.

* *Per* Geographical Table annexed to Geography for Youth.

PROBLEM IX.

To find the difference of longitude between any two places.

Find their respective longitudes; then, if both places lie on the same side of the first meridian, subtract the less longitude from the greater, and the remainder will be the required difference of longitude. But if they lie on different sides of the first meridian, the sum of both longitudes will be the difference of longitude, if it be less than 180°; but if more, the remainder to 360° will be the difference of longitude required.

Note	360°	=	24 hours.
	15°	=	1 hour.
	1°	=	4 minutes.
	1′	=	4 seconds.

EXAMPLES.

Find the difference of longitude, and the difference of time, between

1. Venice and Mecca.
2. C. Rasalgat and C. Comorin.
3. Cork and Canton.
4. Rome and Calcutta.
5. Pico and Botany-Bay.
6. London and St. Domingo*.
7. Vera Cruz and Siam.
8. Land's end and Leghorn. (*Vide* White's Ephemeris, p. 48.)

* When the first meridian passes through one of the places, the longitude of the other place is the difference of longitude.

PROBLEM

PROBLEM X.

To find the diſtance between any two places on the globe.

Having found, by means of the quadrant of altitude, or a pair of compaſſes, the number of degrees between the two places, multiply it by 60 or $69\frac{1}{2}$, and the product will be the diſtance, in geographical or ſtatute miles reſpectively.

Note. The quadrant of altitude is a thin ſlip of braſs, divided into ninety equal parts or degrees, anſwering to ſo many degrees of a great circle.

EXAMPLES.

Required the diſtance in degrees, geographical miles, and ſtatute miles, from

1. London to Hanover.
2. York to Vienna.
3. Liſbon to Conſtantinople.
4. Cairo to Bourdeaux or Peterſburg.
5. Briſtol to Halifax.
6. The tropic of Capricorn to the arctic circle.
7. The arctic circle to the antarctic circle.
8. Pole to pole.

PROBLEM XI.

To find the bearing of any one place from another.

Rectify the globe for the latitude of that place from which the bearing is required, over which fix the quadrant of altitude, and lay the said quadrant over the other place, and it will shew, by the mariner's compass on the horizon, the position of the latter from the former.

Note. Bearing is the situation of one place with respect to another. It's use is in navigation, to shew what course a ship must steer, to sail from one port, or given place, to another.

EXAMPLES.

Required the bearing of the following places, *viz.*

1. Of Pondicherry from London.
2. Of Bourdeaux from Lisbon.
3. Of C. Finisterre from C. Verd.
4. Of Madeira from Chester.
5. Of Jamaica from Chester.
6. Of Archangel from Chester.
7. Of Chester from Archangel.
8. Of Jerusalem from London.

PROBLEM

PROBLEM XII.

For any given hour at any place, to find what hour it is, at any other place.

Bring the place where the hour is given, to the meridian, and set the index to the given hour; then turn the globe about, and when the other place comes to the meridian, the index will shew the hour of the day at that place*.

EXAMPLES.

Given place.	Given hour.	Place or places at which the hour is required.
1. Venice.	4*h*. P. M.	Mecca.
2. Mecca.	4*h*. P. M.	Venice.
3. Canton.	9*h*. P. M.	Cork.
4. Cork.	9*h*. P. M.	Canton.
5. Pico.	Noon.	Botany-Bay.
6. London.	4*h*. P. M.	Rome, Constantinople, Ft. St. George, Pekin, Domingo, Barbadoes.
7. I. of Canary.	4*h*. P. M.	Port-royal.
8. Mexico.	3*h*. P. M.	Petersburg.

* *Vide* Bonnycastle's Astronomy, Letter x.

PROBLEM XIII.

For any given hour at a given place, to find all those places, where it is any other given hour of the day.

Bring the given place to the meridian, and set the index to the given hour; then turn the globe till the index points to the other given hour, and all those places which lie under the meridian have the same hour.

EXAMPLES.

Given place.	Given hour.	Hour proposed.
1. Jerusalem.	7*h.* A. M.	Noon.
2. Vienna.	8*h.* 15*m.* A. M.	Noon.
3. Port-royal.	Noon.	5*h.* P. M.
4. Cork.	1*h.* P. M.	9*h.* P. M.
5. F.St.George.	9*h.* 15*m.* P. M.	4*h.* P. M.
6. Mexico.	Midnight.	9*h.* A. M.
7. Petersburg.	Midnight.	3*h.* P. M.
8. Quebec.	6*h.* 30*m.* A. M.	11*h.* A. M.

PROBLEM XIV.

To find the time of the ſun's riſing and ſetting, and the length of the day and night, at any given place.

Having rectified the globe, bring the ſun's place in the ecliptic to the eaſtern ſide of the horizon, and the index will ſhew the time of the ſun's riſing; then turn the globe until the ſun's place comes to the weſtern ſide of the horizon, and the index will ſhew the time of its ſetting; the hour of ſun-ſetting doubled, gives the length of the day, and the hour of ſun-riſing doubled, gives the length of the night.

EXAMPLES.

Given place.	Day of the month.
1. Peterſburg.	July 23.
2. Jeruſalem.	March 20, or Sept. 23.
3. Jeruſalem.	June 21.
4. Jeruſalem.	December 21.
5. Edinburgh.	November 30.
6. Archangel.	June 21.
7. Port-royal.	June 21.
8. Stockholm.	July 7.

PROBLEM XV.

To find when the morning twilight begins, and when the evening twilight ends, at any given place.

Rectify the globe, and bring the ſun's place in the ecliptic to the eaſtern ſide of the horizon, then fix the quadrant of depreſſion on the wooden horizon, and turn the globe until the ſun's place is 18 degrees below the horizon, and the index will point out the time, when the morning twilight begins. To find the time when the evening twilight ends, bring the ſun's place to the weſtern ſide of the horizon, and turn the globe until the ſaid point be 18 degrees below the horizon, and the index will ſhew the time, when the evening twilight ends.

Note. The quadrant of depreſſion is an inſtrument ſimilar to the quadrant of altitude, but made ſo as to reſt on the upper ſurface of the wooden horizon, and the ſlip, which is graduated on one ſide, falls below in ſuch a manner, that the degrees of depreſſion may thereby be eaſily aſcertained.—The common method of performing this problem, by elevating the oppoſite point of the ecliptic, is not ſo eaſily underſtood by learners.

EXAMPLES.

Given place.	Day of the month.
1. I. of Minorca.	March 20.
2. The ſame place.	December 21.
3. The ſame place.	June 21.
4. Macclesfield. (Lat. 53° 15′ N.)	March 20.
5. The ſame place.	December 21.
6. The ſame place.	June 21.
7. Jamaica.	June 21.
8. The north pole.	January 28.

PROBLEM

PROBLEM XVII.

To find the length of the longest day in any given place.

Elevate the north pole equal to the latitude of the place, bring the first point of Cancer to the eastern side of the horizon, and set the index to the upper XII; then turn the globe till the first point of Cancer comes to the western side of the horizon, and the hours passed over by the index will be the length of the sun's diurnal arc, on the longest day. Allowing *one* for every half hour above 12, will give the climate in which the place proposed is situated.

Note. A part of half an hour must be reckoned as another climate. For instance, where the length of the longest day is 14*h.* 45*m.* that place is situated in the 6th climate from the equator.

EXAMPLES.

Required the length of the longest day at the following places.

1. Barbadoes.
2. Bombay.
3. Ispahan.
4. Pekin.
5. Marseilles.
6. Moscow or Copenhagen.
7. Bergen.
8. Archangel.

PROBLEM

PROBLEM XVII.

To find on what day the ſun begins to ſhine conſtantly, at any given place in either of the frigid zones, and how long.

Obſerve the diſtance of the given place from the pole, and count an equal number of degrees from the equator towards the ſame pole, and turning the globe round, mark thoſe two points of the ecliptic, which paſs under that degree; then find, by the calendar on the horizon, on what days of the year the ſun is in thoſe points of the ecliptic, and thoſe are the days required. Adding *one* to four-and-twenty for every month, will ſhew the climate in which the place propoſed is ſituated.

Note. A fraction of a month muſt be accounted as another climate. For inſtance, if the continuance of the ſun above the horizon is equal to 3 months and 15 days, the place is ſituated in the 28th climate from the equator.

EXAMPLES.

Given place or latitude.

1. The north pole.
2. The ſouth pole.
3. 86° N.
4. 80° N.
5. Cherry Iſland. (Lat. 75° N.)
6. 75° S.
7. 70° N.
8. Sir Thomas Smith's ſound.

PROBLEM

PROBLEM XVIII.

To find the latitude of those places in the north frigid zone, where the sun begins to shine constantly, on any day between the vernal equinox and the summer solstice, or in the south frigid zone, on any day between the autumnal equinox and the winter solstice.

Find the sun's declination for the given day, subtract it from 90°, and the remainder will be the latitude of those places, where the sun begins to shine constantly. The latitude is of the same affection as the declination of the sun.

Or, Bring the day of the month in the scale of the sun's declination, to the lower meridian, and the degree over it, will be the latitude required.

EXAMPLES.

Required the latitude of those places, where the sun begins to shine constantly, on the following days.

1. March 20.
2. September 23.
3. March 31.
4. April 16.
5. April 30.
6. November 2.
7. May 21.
8. April 18.

PROBLEM XIX.

To find those places, to which the sun is vertical, on any given day.

Bring the sun's place for the given day, to the meridian, and observe the degree of it's declination; then turn the globe about, and all those places which pass under that degree of the meridian, are those required.

EXAMPLES.

Required those places, to which the sun is vertical, on the following days.

1. March 20.	5. September 13.
2. August 1.	6. March 5.
3. April 30.	7. May 16.
4. June 21.	8. July 23.

PROBLEM XX.

To find what days in the year, the sun will be vertical to any given place in the torrid zone.

Bring the given place to the meridian, and mark the degree exactly over it; then turn the globe round, and observe the two points of the ecliptic, which pass under that degree of the meridian. Lastly, find, by the calendar on the horizon, on what days the sun is in those points of the ecliptic, and they are the days required.

EXAMPLES.

Required the days, on which the sun is vertical to the following places.

1. Lara. (In the I. of Borneo.)	5. Borneo.
2. Port-royal.	6. Bantam.
3. C. Verd.	7. Bombay.
4. Canton.	8. Mexico.

PROBLEM

PROBLEM XXI.

To find those places, to which the sun is vertical, on any given day and hour.

Find the sun's place, and bring it to the meridian, and mark the degree of declination; then find those places, where it is noon at the given time, and that which is under the degree of declination, will be the place required.

EXAMPLES.

Given day.	Hour and place.
1. September 23.	7*h.* 30*m.* A. M. at Bagdad.
2. August 1.	5*h.* - - - P. M. at Bristol.
3. April 30.	2*h.* - - - P. M. at Amsterdam.
4. June 21.	Noon, - - - - - at Canton.
5. September 13.	7*h.* - - - A. M. at Jerusalem.
6. March 5.	0*h.* 30*m.* P. M. at Canton.
7. May 16.	8*h.* 15*m.* A. M. at Vienna.
8. May 21.	Midnight, - - - at Calicut.

PROBLEM XXII.

To find the Antœci, Periœci, and Antipodes of any given place.

Bring the given place to the meridian, and having found it's latitude, count the ſame number of degrees, towards the contrary pole, and under the degree, where the reckoning ends, is the Antœci of the given place. Thoſe who live at the equator have no Antœci. The globe remaining in the ſame poſition, ſet the index to the upper XII, and turn the globe about till the index points to the lower XII, then that part of the globe which lies under the meridian, in the ſame latitude with the given place, is the Periœci required. Thoſe who live at the poles have no Periœci. As the globe now ſtands, the Antipodes of the given place will lie under the ſame point of the brazen meridian, where it's Antœci ſtood before. Or the Antipodes may be found, by bringing the given place to the north point of the horizon, and at the oppoſite point of the horizon, will be the Antipodes required. Every place has it's Antipodes.

EXAMPLES.

Situation of the given place.	Place required.
1. 103° W. and 20° S.	Antœci.
2. 180° long. and 51½° N.	Periœci.
3. 178° E. and 56° S.	Antipodes.
4. 86° E. and 22° S.	Antœci.
5. 137° W. and 22° N.	Periœci.
6. 29° W. and 34½° N.	Antipodes.
7. 180° long. and 51½° S.	Antipodes.
8. 65° W. and 40° S.	Antipodes.

PROBLEM

PROBLEM XXIII.

To find, for any given day and hour, those places where the sun is then rising or setting, or on the meridian; also, those places which are enlightened at that time, and those which are not.

Find the place to which the sun is vertical, at the given time, and bring the same to the meridian, and elevate the pole to the latitude of the place: then all those places, which are in the western semicircle of the horizon, have the sun rising, and those in the eastern semicircle have it setting, and at those under the upper semicircle of the meridian it is noon; and all those which are above the horizon are enlightened by the sun; and at all those places which are 18 degrees below the eastern semicircle of the horizon, the evening twilight is ending, and at those which are 18 degrees below the western semicircle of the horizon, the morning twilight is just beginning, and all those places, that are lower than 18 degrees, have dark night.

EXAMPLES.

I. On the 27th of April, 6*h*. 45*m*. A. M. at London; it is required to find all those places where the sun is then rising, setting, or on the meridian; also, where it is day-light, twilight, or dark-night.

SOLUTION.

Per Prob. 21. The sun is at that time vertical to Madrass, on the coast of Coromandel, in the East Indies.

Having rectified the globe for the latitude of Madrafs, 14° N. and brought it to the brazen meridian, then

1. In all places above the horizon it is day-light, which, in this cafe, happens to be almoft all Europe, Afia, and Africa, the altitude of the fun in each place being equal to it's refpective diftance from the horizon.

2. In all places under the horizon, *viz.* in the continents of N. and S. America, it is dark-night, except in places within 18° of the horizon, where it is twilight; on the weftern fide, it is morning, and on the eaftern fide, it is evening, twilight.

3. All the places in the weftern femicircle of the horizon, have the fun rifing, *viz.* Teneriffe (one of the Canary Iflands,) the Grain Coaft in Africa, and the I. of St. Helena. All the places in the eaftern femicircle of the horizon, have the fun fetting.

4. It is noon at all the places under the upper part of the meridian, *viz.* at Pondicherry, and the I. of Ceylon. And

5. 'Tis midnight at thofe under the lower part of the meridian, *viz.* at Vera Cruz (in Mexico,) and part of the South and Pacific oceans.

II. On the 11th of May, 6*h.* P. M. at C. Finifterre, it is required to find the places where it is [1] day-light, [2] dark-night, and [3] twilight; at what places the fun is then [4] rifing, and [5] fetting; alfo, where it is [6] noon, and where [7] midnight, at the fame time.

PROBLEM

PROBLEM XXIV.

The day and hour of a lunar eclipse being given, to find at what places the same will be visible.

Find the place to which the sun is vertical at the given time, and rectify the globe for the Antipodes of that place, and the places then above the horizon, are those to which the eclipse will be visible.

EXAMPLES.

1. On the 14th of February, 1794, 10*h.* 12*m.* P. M. at London, there will be a total eclipse of the moon; required those places where the same will be visible.

2. On the 27th of May, 1798, 7*h.* P. M. at London, there will be a total eclipse of the moon; required the places to which it will be visible.

For other examples, *vide* the Ephemeris for the current year.

PROBLEM XXV.

To find the sun's declination for any given day, by the scale of the sun's declination.

Bring the scale to the meridian, and over the given day, is the declination required.

EXAMPLES.

Vide Problem III.

PROBLEM XXVI.

To find, by the ſcale of declination, the time of the ſun's riſing and ſetting, for any given day, in a given latitude.

Having rectified the globe for the given latitude, bring the middle part of the ſcale to the meridian, and ſet the index to XII; then bring the given day in the ſcale to the eaſtern or weſtern horizon, and the index will ſhew the hour of the ſun's riſing or ſetting, on that day.

EXAMPLES.

Given place.	Day of the month.
1. Peterſburg.	July 23.
2. Jeruſalem.	March 20, or Sept. 23.
3. Jeruſalem.	June 21.
4. Jeruſalem.	December 21.
5. Edinburgh.	November 30.
6. Archangel.	June 21.
7. Port-royal.	June 21.
8. Stockholm.	July 7.

End of Problems on the Terreſtrial Globe.

OF THE

CELESTIAL GLOBE.

ON the ſurface of the Celeſtial Globe are placed all the ſtars of the firſt and ſecond magnitude, and the moſt noted of the reſt, which are viſible. The ſtars are diſpoſed into conſtellations, under the forms of ſuch animals, or other figures, as are delineated on the celeſtial globe, which were invented by the ancient Aſtronomers and Poets, and are ſtill retained for the ſake of diſtinction, and to avoid confuſion, in comparing the ancient and modern obſervations. The ſtars in each conſtellation are marked with Greek letters, and ſome remarkable ſtars are called by proper names. Thoſe ſtars which are not reduced into conſtellations are called unformed ſtars.

DEFINITIONS.

1. Declination of the ſun, moon or ſtars, is their diſtance from the equinoctial, reckoned in degrees of the general meridian, towards the north or ſouth poles.

2. Right Ascension, is that degree of the equinoctial, reckoned from the firſt point of Aries, which comes to the meridian with the ſun, moon or ſtar.

3. Oblique Ascension or Descension, is that degree of the equinoctial, counted from Aries, which comes to the horizon, when the ſun or a ſtar is either riſing, or ſetting.

4. Ascensional Difference, is the difference between the right and oblique aſcenſion or deſcenſion; which, being turned into time, ſhews how long the ſun riſes or ſets before, or after ſix o'clock.

5. Latitude of a ſtar or planet, is it's diſtance from the ecliptic, counted in degrees of the quadrant of altitude, towards the poles of the ecliptic, either north or ſouth.

6. Longitude of a ſtar or planet, is an arc of the ecliptic, contained between the firſt point of Aries, and that point of the ecliptic, to which the object is referred by a great circle which is perpendicular to it, reckoned in ſigns, degrees, minutes, &c. upon the ecliptic.

7. Amplitude, is the number of degrees that the ſun or a ſtar riſes or ſets from the eaſt or weſt point of the heavens, counted on the horizon towards the north or ſouth.

8. Vertical or Azimuth Circles, great circles which paſs through the zenith and nadir, and are perpendicular to the horizon.

9. Azimuth,

9. AZIMUTH, is the diſtance between the north or ſouth points, and the point where the vertical circle, paſſing through the center of any object, cuts the horizon.

10. ALTITUDE, the height of the ſun, moon or ſtars, above the horizon, meaſured in degrees of the quadrant of altitude, and if the object be on the meridian it is called the meridian altitude. The complement of the altitude is the zenith diſtance.

11. CULMINATING, or ſouthing, is when the ſun or a ſtar comes to the meridian of any place.

12. COLURES, two great circles, one of which paſſes through the ſolſtitial points Cancer and Capricorn, and the other through the equinoctial points Aries and Libra.

13. DIRECT, a planet is ſaid to be *direct*, when it moves according to the order of the ſigns in the ecliptic.

14. RETROGRADE, a planet is ſaid to be *retrograde*, when it *apparently* goes backwards or contrary to the order of the ſigns.

15. STATIONARY, a planet is ſaid to be *ſtationary*, when it has no apparent motion.

16. DIGIT, the twelfth part of the Sun's diameter.

17. GEOCENTRIC place of a planet, is that ſituation in which it appears when ſeen from the earth.

18. HELIOCENTRIC place of a planet, is that ſituation in which it would appear to a ſpectator placed in the ſun.

19. PLANETS, thoſe bodies, in our ſyſtem, which regard the ſun as the center of their motions; the number of which is ſeven, and their names and characters as follows. Mercury ☿, Venus ♀, the Earth ⊕, Mars ♂, Jupiter ♃, Saturn ♄, and the Georgium Sidus ♅.

20. SATELLITES, ſecondary planets or moons, which revolve round their reſpective primaries, in the ſame manner as thoſe primaries revolve round the ſun. Georgium Sidus has two ſatellites, Saturn ſeven, Jupiter four, and the Earth one, called the moon.

21. POLE STAR, a ſtar of the ſecond magnitude in the tail of Urſa Minor, ſituated near the arctic or north pole.

22. PRECESSION of the equinoxes, a retrograde motion of the two equinoctial points, which are found to go backwards about fifty ſeconds in a year.

23. STARS, (fixed) thoſe bodies which ſhine by their own light, and are not ſubject to motion, like the planets, which are always changing their poſitions, and are thence called erratic or wandering ſtars.

27. ZODIAC; a zone or girdle, ſurrounding the heavens, of about eighteen degrees broad, in the middle of which is the ecliptic containing the twelve ſigns or conſtellations of the zodiac.

As the equator, ecliptic, horizon, and brazen meridian, are exactly alike on both globes, all problems concerning the ſun, are ſolved the ſame way by both globes.

The celeſtial globe is alſo rectified in the ſame manner as the terreſtrial.

PROBLEMS

PROBLEMS

ON THE

CELESTIAL GLOBE.

PROBLEM I.

To find the declination of any fixed ſtar.

Bring the given ſtar to the brazen meridian, and the degree over it, is the declination required.

EXAMPLES.

Required the declinations of the following fixed ſtars.

1. α *Arietis*, 2 Mag. The Ram's following horn.
2. β *Tauri*, 2 Mag. The Bull's north horn.
3. ι *Sagittarii*, 2 Mag.
4. α *Urſæ Majoris*, 2 Mag. Upper pointer.
5. α *Lyræ*, 1 Mag. Bright ſtar in the Harp.
6. α, *Capella*, 1 Mag. The Goat ſtar.
7. α, *Procyon*, 1 Mag. In the leſs Dog's belly.
8. α, *Sirius*, 1 Mag. The Dog ſtar.

PROBLEM

PROBLEM II.

To find the right aſcenſion of the ſun, or any fixed ſtar.

Bring the ſun's place, or any given ſtar, to the brazen meridian, and that degree of the equinoctial, which is cut by the meridian, is the right aſcenſion required.

EXAMPLES.

Required the right aſcenſion of the ſun on each of the following days.

1. June 21.
2. November 30.

Required the right aſcenſions of the following ſtars.

3. α, *Aldebaran*, 1 Mag. The Bull's ſouth eye.
4. β, *Pollux*, 2 Mag. Head of the ſecond Twin.
5. α *Libræ*, 2 Mag. Southern Scale.
6. γ *Draconis*, 2 Mag. Dragon's Head.
7. γ *Pegaſi*, 2 Mag. The extremity of Pegaſus's [wing.
8. α, *Betelgeuſe*, 1 Mag. Orion's right ſhoulder.

PROBLEM

PROBLEM III.

To find any ſtar by the given declination and right aſcenſion.

Bring the degree of right aſcenſion to the meridian, and under the given degree of declination, will be the ſtar required.

EXAMPLES.

Required the ſtars, the right aſcenſions and declinations of which are as follows.

	°	′		°	′	
1.	110	18	and	32	20	N.
2.	226	27	and	8	36	S.
3.	162	16	and	57	30	N.
4.	211	33	and	20	20	N.
5.	43	38	and	40	8	N.
6.	21	30	and	58	30	S.
7.	295	6	and	8	19	N.
8.	94	0	and	52	0	S.

PROBLEM IV.

To find the latitude and longitude of a ſtar.

Bring the pole of the ecliptic to the meridian, over which ſcrew the quadrant of altitude, and bring it's graduated edge to the ſtar: then the degree on the quadrant, cut by the ſtar, is it's latitude; and the degree of the ecliptic, cut by the quadrant, is it's longitude.

EXAMPLES.

Required the latitude and longitude of each of the following ſtars.

1. α *Arietis*, 2 Mag. The Ram's following horn.
2. β, *Algol*, 2 Mag. Meduſa's head.
3. α, *Capella*, 1 Mag. In the conſtellation Auriga.
4. α, *Caſtor*, 1 Mag. In the conſtellation Gemini.
5. α, *Arcturus*, 1 Mag. In the conſtellation Bootes.
6. α, *Cor Scorpionis*, 1 Mag. Scorpion's heart.
7. α *Lyræ*, 1 Mag. Bright ſtar in the Harp.
8. α, *Markab*, 2 Mag. Pegaſus's wing.

PROBLEM

PROBLEM V.

To find at what hour any ſtar riſes, comes to the meridian, or ſets, the latitude of the place and day of the month being given.

Having rectified the globe, bring the given ſtar to the eaſtern ſide of the horizon, and the index will ſhew the hour of it's riſing; then turn the globe till the ſtar comes to the brazen meridian, and the index will ſhew the time of it's culminating: laſtly, bring the ſtar to the weſtern ſide of the horizon, and the index will ſhew the hour of it's ſetting.

Note. All thoſe ſtars, in the ſame hemiſphere, whoſe diſtance from the pole is not greater than the latitude of any given place, never ſet. On the contrary, all thoſe ſtars, in the other hemiſphere, whoſe diſtance from the pole does not exceed the latitude of the place, never riſe.

EXAMPLES.

Given place and day.		Given ſtar.
1. Liſbon	May 18.	α, *Spica Virginis*, 1 M.
2. Madrid.	April 15.	α, *Sirius*, 1 Mag.
3. Jeruſalem.	Feb. 22.	α *Arietis*, 2 Mag.
4. Stockholm.	July 7.	α, *Aldebaran*, 1 Mag.
5. London.	Nov. 17.	The *Pleiades*, in Taurus.
6. Canton.	March 10.	γ *Virginis*, 1 Mag.
7. Conſtantinople	Dec. 7.	The Pointers.
8. Cape Horn.	June 11.	α *Canis Majoris*, 1 M.

PROBLEM

PROBLEM VI.

For any given place and day, to find the sun's oblique ascension, the ascensional difference, and, thence, the hour of sun rising.

The solution of this problem is sufficiently obvious from problem 2, and the particulars stated in definitions 3 and 4.

Note. In north latitudes, when the sun is in any of the northern signs, it rises *before*, and when in any of the southern signs, *after*, six.

EXAMPLES.

Required the sun's right ascension, oblique ascension, and ascensional difference, and the time of sun rising, at each of the following places.

Given place.	Day of the month.
1. Lisbon.	May 18.
2. Madrid.	April 15.
3. Jerusalem.	February 22.
4. Bombay.	March 20.
5. Stockholm.	July 7.
6. London.	November 17.
7. Canton.	March 10.
8. Constantinople.	December 7.

PROBLEM VII.

To find the sun's eastern and western amplitude, at any given place, on any given day.

Rectify the globe, and bring the sun's place to the eastern and western sides of the horizon; then the number of degrees on the horizon, intercepted between the east or west points and the sun's place, is the eastern or western amplitude, counted towards the north or south.

Note. This problem furnishes an easy method of determining the variation of the compass. For if the amplitude of the sun be thus found, and the point be observed in which it appears to rise or set by the compass, the difference between these two will give the variation.——On the same day, the western and eastern amplitudes are nearly equal. In our hemisphere, the former exceeds the latter, when the sun is in any of the spring or autumnal signs, and the reverse when the sun is in any of the summer or winter signs.

EXAMPLES.

Required the sun's amplitude, ortive and occasive, at each of the following places.

Given place.	Day of the Month.
1. Lisbon.	May 18.
2. Madrid.	April 15.
3. Jerusalem.	February 22.
4. Bombay.	March 20.
5. Stockholm.	July 7.
6. London.	November 17.
7. Canton.	March 10.
8. Constantinople.	December 7.

PROBLEM

PROBLEM VIII.

To find the sun's altitude and azimuth, for any given hour of the day.

Rectify the globe for the given day and hour, fix the quadrant of altitude to the zenith, and lay it over the sun's place: then the number of degrees upon the quadrant, between the sun's place and the horizon, is the altitude; and the arc of the horizon, intercepted between the points of north or south and the foot of the quadrant, is the azimuth of the sun, either easterly or westerly.

Note. When the sun is on the meridian, it's altitude is then greatest, and it's azimuth nothing.

EXAMPLES.

Required the altitude and azimuth of the sun, at the following places, on the annexed days.

Given place.	Day and hour proposed.	
1. Lisbon.	May 18.	7*h*. 30*m*. A. M.
2. Madrid.	April 15.	10*h*. A.M. or 2*h*. P. M.
3. Jerusalem.	Feb. 22.	8*h*. 45*m*. A. M.
4. Bombay.	March 20.	9*h*. 30*m*. A. M.
5. Stockholm.	July 7.	3*h*. 45*m*. A. M.
6. London.	Nov. 17.	10*h*. 15*m*. A. M.
7. Canton.	March 10.	8*h*. A.M. or 4*h*. P.M.
8. Constantinople.	Dec. 7.	8*h*. 45*m*. A. M.

PROBLEM

PROBLEM IX.

To find the place of the moon, or of any planet, on a given day.

In WHITE's Ephemeris, againſt the given day, you will find the Geocentric place of the moon or planet at noon, under the title of *longitude*. The degree thus found being marked on the ecliptic, (regard being had to the planet's latitude,) you may then proceed to find it's declination, right aſcenſion, altitude, azimuth, riſing, ſouthing, ſetting, &c. in the ſame manner as has been ſhewn for the ſun.

Note. The ſituation of the Georgian or New planet, it's declination, and time of culminating, are given in a ſeparate table, at the end of the calendar.

EXAMPLE.

Required the place of the ☽, it's declination and right aſcenſion, and the place, declination and right aſcenſion of each of the planets, ♄, ♃, ♂, ♀, ☿, Georgium Sidus, at London, on the 14th of May, at noon.

PROBLEM

PROBLEM X.

The day of the month being given, to find at what hour any ſtar will be on the meridian.

Bring the ſun's place to the meridian, and ſet the index to XII at noon; then turn the globe till the ſtar comes to the meridian, and the index will ſhew the hour required.

Note. The ſtar's right aſcenſion being ſubtracted from the right aſcenſion of the ſun, the remainder (turned into time) ſhews how long the ſtar comes to the meridian, before the ſun. On the contrary, the ſun's right aſcenſion being taken from the right aſcenſion of the ſtar, ſhews the time which the ſtar comes to the meridian, after the ſun.

EXAMPLES.

On the following days, required the time when the under-mentioned ſtars come to the meridian.

Day of the month.	Given ſtar.
1. October 24.	α *Leonis, Regulus.*
2. September 20.	γ *Andromedæ, Almach.*
3. June 6.	α *Draconis,* 2 Mag.
4. January 7.	γ *Orionis, Bellatrix.*
5. November 8.	β *Caſſiopeiæ,* 2 Mag.
6. Auguſt 22.	α *Herculis,* 2. 3 Mag.
7. May 5.	α *Ceti, Menkar.*
8. December 13.	α *Coronæ Septentrionalis,* 2 M.

PROBLEM XI.

To find on what day of the year, a given star will be on the meridian, at any given hour.

Bring the ſtar to the meridian, and ſet the index to the given hour; then turn the globe till the index points to the upper XII, and obſerve the degree of the ecliptic cut by the meridian, which is the ſun's place. Then find, in the calendar on the horizon, the day anſwering to that degree, and it is the anſwer to the problem.

EXAMPLES.

Find on what days the following ſtars will come to the meridian, at the hours propoſed.

Given ſtar.	Hour propoſed.
1. α *Perſei, Algenib.*	6*h.* 0*m.* P. M.
2. β *Orionis, Rigel.*	7*h.* 59*m.* P. M.
3. ι *Orionis*, 2 Mag.	5*h.* 0*m.* P. M.
4. α, *Cor Hydræ, Alphard.*	3*h.* 0*m.* A. M.
5. α *Serpentarii*, 2 Mag.	Noon.
6. α *Aquilæ, Atair.*	Midnight.
7. ι *Urſæ Majoris, Aliath.*	1*h.* 1*m.* P. M.
8. α *Piſcis Auſtralis.*	9*h.* 0*m.* A. M.

PROBLEM

PROBLEM XII.

To represent the situation of the principal stars, as seen in the heavens, at any given time and place.

Rectify the globe, and turn it about till the index points to the given hour: then the upper hemisphere of the globe, will represent the face or appearance of the heavens, for that time; all the stars on the globe being then in such situations, as exactly correspond to those in the heavens. And if the globe be placed north and south, the constellations, remarkable stars and planets, then visible, may easily be distinguished.

EXAMPLE.

The situation of the fixed stars, on the 9th of February, at London (Lat. 50° 31′ N.) at 9 in the evening, will be nearly as follows.

Sirius or the Dog star, which is the brightest in the heavens, will be on the meridian, it's altitude twenty-two degrees.——Procyon or the less Dog, sixteen degrees towards the east, it's altitude forty-three degrees.——About twenty-four degrees above Procyon, and somewhat more easterly, are the Twins, Castor and Pollux.——Sixty-five degrees from the south towards the east, and thirty-five degrees in height, is the bright star Regulus or

Cor

Cor Leonis.———Exactly in the east, and twenty-two degrees in height, is the star Deneb, in the Lion's tail.———Thirty degrees from the east towards the north, and three degrees above the horizon, is Arcturus, a star of the first magnitude, situated in the skirts of the constellation Bootes.——— Directly over this last, and thirty-one degrees above the horizon, is Cor Caroli or Charles's Heart, situated between Coma Berenices and Ursa Major, so called in honour of King Charles the First.——— In the north-east are, the star in the extremity of the Great Bear's tail,———Aliath, the first star in the tail,———and Dubhe, the northernmost pointer. The altitude of the first of these is thirty degrees; that of the second, forty-one degrees; and that of the third, fifty-six degrees.———Reckoning from the meridian westward, we see the beautiful constellation Orion, consisting of ninety-three stars; the middle star in his belt is twenty degrees from the south towards the west, its altitude thirty-five degrees.———Nine degrees below Orion's belt, and a little more westerly, is Rigel, the bright star in his heel.———Above his belt, in a straight line drawn from Rigel between the middle and most northward in his belt, and nine degrees above it, is the bright star in his shoulder called Betelgeuse.———South, forty-nine degrees west, and forty-five degrees above the horizon, is Aldebaran, a star of the first magnitude, situated in the head of the constellation Taurus, and from thence by some called the Bull's eye.———A line joining this last and Sirius (under the meridian) passes a very little above Orion's belt, the middle star in which is equally distant from each.——— A little to the west of Aldebaran, in the face of Taurus, are the Hyades; and in the neck of the same constellation, about south, seventy degrees west, are the Pleiades.———In the west-by-south

 point,

point, is Capella, in Auriga, its altitude seventy-three degrees.——A line drawn from Aurigæ to Betelgeuse, passes through the Kids, two small stars in Auriga, and also through the two stars in the extremities of the Bull's horns.——In the north-west, and about forty-two degrees high, is the constellation Cassiopeia, composed of fifty-two stars; ——and almost in the north, and near the horizon, is the constellation Cygnus, consisting of seventy-three stars.——The two stars called the pointers, are so denominated, because a line drawn through them will nearly pass through the star in the tail of the Little Bear, called Alruccabah, the Pole-star, round which all the stars appear to revolve.

APPENDIX
to the Third Edition, containing a Collection of
QUESTIONS,
with Occasional Remarks;
including a short, but comprehensive Epitome of
MODERN GEOGRAPHY.

PROBLEM I.

1. *What is Geography?*
2. *What is a Globe?*
3. *How many sorts of Artificial Globes are there?*
4. *What is meant by the Use of the Globes?*

Occasional Remark. The Globes are extremely proper for giving the most perfect idea of the comparative extent and situation of the several parts of the earth, and for explaining the celestial phenomena at any particular place; but, where much exactness is required, they are somewhat defective, since we cannot pretend to greater accuracy than that of a quarter of a degree.

5. *What is a Great Circle?—Give an example or two.*

Occasional Remark. There are, in all, *four* great circles on the Terrestrial Globe.

6. *What is a Lesser Circle?—Give some examples.*

7. *Into how many parts or degrees is a great circle divided?*

8. *What is the length of a degree in English miles?*

9. *Into how many parts is a degree usually divided in geography?*

10. *What great circle divides the Northern from the Southern hemisphere?*

11. *What great circle separates the Eastern from the Western hemisphere?*

12. *What great circle divides the Upper from the Lower hemisphere?*

Occasional Remark. The former is usually considered as the enlightened part of the Globe, and the latter as the unenlightened part.

13. *What do you mean by the term Latitude in Geography?*

Occasional Remark. The term Latitude in Astronomy, has a different signification.

14. *How far do the degrees of latitude extend?*

15. *How do you find the latitude of any place on the Globe?*

PROBLEM II.

16. *What is the Ecliptic in Geography?*

17. *Into how many signs is it divided?—Name them.*

18. *Which are the four cardinal signs?*

19. *Which are the equinoctial signs?*

20. *How are the Equinoxes respectively distinguished, by those who live in the northern hemisphere?*

21. *Which are the Solstitial signs?*

22. *How are the Solstices distinguished respectively, by the inhabitants of the northern hemisphere?*

23. *How many signs are contained in the northern semi-circle of the ecliptic?—Name them.*

24. *Name the signs which are contained in the southern semi-circle of the ecliptic.*

25. *With respect to those who live in the northern hemisphere, what signs are contained in the spring, summer, autumnal, and winter quarters respectively? And first, what signs are contained in the spring quarter?—in the summer quarter?—in the autumnal quarter?—and lastly, in the winter quarter?*

26. *With respect to the inhabitants of the southern hemisphere, which are the signs belonging to their four quarters of the year respectively?*

27. *In respect to the direction of the sun's apparent course through the zodiac, the ecliptic is divided into Ascending and Descending signs. Name the Ascending, and likewise the Descending signs.*

Occasional Remark. The Zodiac is a broad space or zone in the heavens, extending 8° on each side of the ecliptic. Within this space the planets are always found, for the inclinations of their orbits to the ecliptic do not exceed that quantity.

28. *How do you find the sun's place in the ecliptic for any given day?*

Occasional Remark. The sun's place may be found with greater accuracy, in the Ephemeris for each current year, its place being there given, under the title of the sun's longitude, in degrees, minutes, and seconds.

The ecliptic is not properly a geographical circle. It belongs to Astronomy, and as such, is peculiar to the Celestial Globe, dividing the surface of the heavens into two equal parts, called the northern and southern hemispheres. But in order that problems relating to the sun, may be performed on the Terrestrial Globe, the ecliptic is always drawn upon it, and, for the sake of uniformity, commences, on our Globes, at the same point as longitude, viz. where the meridian of Greenwich cuts the equator. The ecliptic, though sometimes represented in a general map of the world, is never inserted in any map which is purely geographical.

PROBLEM III.

29. *When has the sun no declination?*

30. *What is the distance of the tropics from the equator, or the sun's greatest declination?*

31. *When is the variation in the length of the days nearly imperceptible?*

32. *When do the days increase or decrease in length most perceptibly?*

33. *What was the first problem on the Terrestrial Globe?*

34. *What is Latitude in geography?*

35. *What was the second problem on the Globe?*

PROBLEM IV.

36. *What was the first problem on the Terrestrial Globe?*

37. *What was the second?*

38. *What was the third?*

39. *What does the astronomical term Declination mean?*

40. *When the globe is rectified, what is the elevation of the pole above the horizon?*

41. *Why is the meridional height of the equator always equal to the complement of the latitude?*—Thus, when the Globe is rectified for Pekin, 40° North, the height of the equator is 50°; when it is rectified for Petersburg, 60° North, the height of the equator is 30°.

42. *What is the Rational horizon?*

Occasional Remark. The word *horizon* was, till of late years, pronounced with the accent on the first syllable, and that this is most agreeable to English analogy cannot be doubted. But poets have constantly placed the accent on the second syllable, because this syllable has the accent in the Greek and Latin word; and this accentuation is now become so general, as to render the former pronunciation vulgar.

43. *What is the Sensible horizon?*

PROBLEM V.

44. *Through what place do the English geographers draw the first meridian?*

45. *The French?*

46. *The Dutch?*

47. *The Americans?*

Occasional Remark. The reason why geographers in general have drawn the first meridian through Ferro, Teneriffe, or Cape de Verd, seems to be, that all the countries in Europe, Asia and Africa may lie on the right-hand side of that meridian, and be comprehended in the eastern hemisphere. By this means also, South America, and nearly the whole of North America, will be contained in the western hemisphere. And, for the same reason, when the first meridian passes through London or Greenwich, the eastern hemisphere commences at 20° west from the first meridian.

48. *What degrees are reckoned from the first meridian?*

49. *Where are they counted, and how far do they extend?*

Occasional Remark. Formerly the longitude was counted quite round, without any distinction of east or west; and even now, in charts of the world, the longitude is numbered the same way, entirely round.—Charts are principally adapted to the practice of navigation, showing the sea and sea coasts, rocks, sands, bearings, &c. In charts, the coasts are shaded on the contrary side of the line,—towards the land. The word *chart* is most frequently, if not universally, pronounced as *cart*, a carriage, and perfectly like the French *carte*.

50. *Where are the degrees of longitude largest?*

51. *What is the length of a degree of longitude at the equator?*

52. *In the latitude of 60°?*

53. *At the Poles?*

54. *What is the distance, at the equator, between the meridians or lines of longitude, upon the globe?*

Occasional Remark. That particular distance seems to have been fixed upon, in order that the meri-

dians might likewise answer the purpose of hour circles; for 15° of longitude or motion, answer to one hour of time, the one being the twenty-fourth part of a day, and the other, 15°, the twenty-fourth part of a great circle, whose revolution is performed in one day.

55. *What is Longitude in geography?*—

But before you answer that question, it may not be amiss to peruse the following remarks or observations upon *what is not Longitude*.

The distance of any place from London, is *not* its Longitude; because Longitude is not reckoned from the city of London, but from the meridian which passes through London, or rather from a certain point in the equator, which is cut by the meridian of London.—Neither is the distance of any place from the meridian of London an *accurate* definition of the term Longitude, as will appear from the following example. The distance of the North Cape from the meridian of London, measured on the parallel of the Cape, with a pair of compasses, is only 7°; whereas the longitude of the North Cape is 22° E.

56. *How is east longitude known from that which is west?*

57. *What was the origin of the terms Longitude and Latitude?*

Occasional Remark. Longitude is generally given in degrees and minutes of the equator, though sometimes in hours (each 15°) and minutes, four of which are equal to a degree of longitude.

PROBLEM VI.

58. *What was the first problem on the Terrestrial Globe?*

59. *What was the second?*

60. *The third?*

Occasional Remark. Declination in astronomy is the same as Latitude in geography.

61. *What was the fourth problem?*

62. *What is meant by Rectifying the Globe?*

63. *How is the Globe rectified for the latitude, and for the sun's place?*

Occasional Remark. When the quadrant of altitude is screwed exactly over the latitude of the given place, the Globe is said to be rectified for the zenith. But this rectification of the Globe is only necessary in one or two problems on the Terrestrial Globe.

64. *What was the fifth problem?*

65. *How is the situation of any particular place on the Globe determined?*

Occasional Remark. By this problem, then, any place not already represented on the Globe, may be laid down or marked upon it; and the situation of any ship, or the place of any naval engagement, may be ascertained, when the longitude and latitude are both given.

66. *What is the true figure of the earth?*

Occasional Remark. Hence it will appear, that the most perfect representation of the earth is by means of an artificial Globe, because the degrees of the equator and of the meridians are, in every part of the Globe, of the same length. But in maps, for instance the general map of the world, in two hemispheres, the degrees near the center are necessarily smaller than those on the circumference or side of the map. This produces some disproportion in the size of those countries which lie nearer to the centre of the map, being smaller in proportion than those which are more remote.—Maps are however extremely convenient in the study of geography, as they admit of an enlargement to a degree not practicable in globes.

67. *What are the most popular proofs in support of that doctrine, viz. that the earth is round or spherical?*

Occasional Remark. It was formerly thought that the earth resembled a long cylinder,—a drum, if you please,—by some it was imagined to be one flat

extended plane, it was even deemed *heretical* to believe that there were antipodes; and Pope Gregory excommunicated all ſuch as believed their exiſtence.

Suppoſing the primitive figure of the earth to have been that of a globe or ſphere, the centrifugal force, or the action ariſing from a conſtant rotation upon its axis, would change it into an oblate ſpheroid. This was the figure determined by Newton, who found, by mathematical calculations, that the polar diameter of the earth is to the equatorial, as 229 is to 230; or, that the regions of the equator are elevated about 35 miles more than thoſe at the poles.

This figure of the earth is confirmed by analogy; for by means of a good teleſcope, it is eaſy to perceive, that the planet Jupiter is flattened about his poles, in nearly the ſame manner as has been aſſerted of our earth; but as his rotation upon his axis is performed with greater rapidity than that of the earth, ſo the alteration in his figure is found to be much more conſiderable, as would naturally follow from ſuch a motion. The relation of his diameters, according to Newton, is nearly as 12 to 13, and the difference between his equatorial and polar diameters is about 6230 miles.

PROBLEM VII.

Occaſional Remark. This problem conſiſts of two parts, entirely diſtinct from each other. The firſt is, to find thoſe places which lie under the ſame meridian, and conſequently have the ſame degree of longitude. And the ſecond part of the problem is, to find all thoſe places which lie in or near the ſame parallel, and conſequently have the ſame degree of latitude. Theſe places being ſituated in the ſame climate, and on the ſame ſide of the equator, have the various ſeaſons of the year, at one and the ſame time, and enjoy the ſame degree of tempera-

ure, with regard to heat or cold, except what difference may arise from local circumstances.

Those places which lie under the same meridian, have exactly the same hours of the day; because, when the sun comes to the meridian of any place, it is noon or mid-day there, and consequently all other places under the same meridian, must have their noon at one and the same instant of time.

The north and south poles have each 90° latitude, and in that respect are peculiarly situated, for no other places on the globe have the same latitude. Their latitude alone therefore gives the true situation of the poles. The poles, being situated at the two extremities of the first meridian, may doubtless, without any impropriety, be said to have no longitude.

It is sometimes useful in conversation to recollect the situation or latitude of the principal cities of Europe. The best method of fixing this in your memory, is to trace with your finger in a map of Europe, those that lie in or near the same parallel.

Beginning with the latitude 41, on the west or left side of the map, and passing a little above the line or parallel of 40, you will first touch upon *Oporto* in Portugal; thence travelling east-ward, you will pass a little above *Madrid*, the capital of Spain; thence over the island of *Sardinia*, to *Naples* and *Mount Vesuvius* in Italy; and thence to *Constantinople*, the capital of Turkey.

If now you move your finger up to 48, and proceed eastward as before, you will pass through *Paris*, the capital of France; *Vienna*, the metropolis of Germany; through *Petersburg*, and the upper part of *Hungary*, and the southern extremity of *Russia*.

About the latitude 51½, you will find *Cape Clear*, a noted promontory, or island, on the south-west coast of Ireland; *Bristol* on the western coast of England, and *London* towards the eastern, the metropolis of the British dominions; *Berlin*, the resi-

dence of the king of Prussia; and *Warsaw*, formerly the capital of Poland.

In the latitude of 56, passing from west to east on the same parallel, you will travel through *Edinburgh*, the capital, and formerly the residence of the kings of Scotland; *Copenhagen*, the capital of the Danish dominions; and thence to *Moscow*. *St. Petersburg*, the modern capital of the Russian empire, lies in 60° of northern latitude, which is also the latitude nearly of *Stockholm* in Sweden; *Bergen* on the coast of Norway, and *Mainland*, the chief of the Shetland isles, which lie together in a cluster at the northern extremity of Scotland.—*Pomona*, the largest of the Orkney islands, is also called, by the inhabitants, *Mainland*.

The arctic circle, latitude 66½ north, passes a little above *Iceland*, over the coast of *Norway*, through *Lapland*, where the French astronomers, in 1737, measured a degree of the meridian which cuts the arctic circle; and the northern parts of the *Russian empire*.

PROBLEM VIII.

68. *In viewing the different parts of a map, from a supposed station in the centre as it were, which way is north, which south, which east, and which west?*

69. *What are those lines called which are drawn breadth-ways, or from west to east, across the map?*

70. *What are the names of the four intermediate circles, and what are their respective distances from the equator?*

71. *Into how many Zones is the globe of the earth divided?*

72. *What circles are the boundaries of the torrid zone?*

73. *What circle lies exactly in the middle of the torrid zone?*

74. *Where are the two temperate zones situated, and what is their breadth?*

75. *What is the situation of the frigid zones?*

76. *How is the latitude of any place found in a map?*

77. *What is meant by the difference of latitude between any two places?*

78. *What is the greatest difference of latitude between any two places on the Globe?*

PROBLEM IX.

79. *What was the eighth problem on the Terrestrial Globe?*

80. *What is meant by the term difference of latitude?*

81. *How do you find the difference of latitude between any two given places?*

82. *What are those lines called which are drawn from north to south, cutting the equator at right angles?*

83. *Are the meridian lines ever called parallels of longitude?*

84. *How do you find the longitude of any given place on the Globe?*

85. *How do you find the longitude of any place in a map?*

86. *What is meant by the term difference of longitude?*

87. *How do you find the difference of longitude between any two places on the Globe?*

Occasional Remark. The difference of longitude between any two places on the Globe, cannot exceed a semi-circle, or 110°.

In one case, the difference of longitude is the same as the longitude, that is, when one of the given places is either London, or any other place situated under the first meridian; for then there is nothing to add to, or subtract from, the longitude of the other place. It is the same respecting latitude, —when one of the given places is under the equator, and consequently has no latitude, the latitude of the other place will be the difference of latitude.

If the exterior or outward circumference of the hour circle were divided into 360 parts or degrees, and numbered both ways entirely round, as on the brass semi-circle or protractor, the true difference of longitude in degrees might then be found by the index, in the same manner as the difference of time between any two places.

If two persons in the latitude of 60°, stand on the same parallel, a yard asunder, their difference of longitude will be just two yards; but if they stand on the same meridian, due north and south, a yard from each other, their difference of latitude will be only one yard.

PROBLEM X.

88. *Having ascertained the distance between any two places, in degrees, how do you reduce them into geographical miles?*

89. *How do you reduce any given number of degrees into English statute miles?*

90. *How do you multiply any number which is greater than 12, and not a composite number, by 69½?*

91. *How is the distance between any two places found in a map?*

Occasional Remark. The degrees of latitude on the side of a map, are, in general, somewhat larger than the truth, unless when the side happens to be nearly parallel to the meridian lines. In order to be as accurate as possible, the degrees of latitude should be graduated upon a meridian, nearly in the middle between the centre and side of the map. See Bowles's one-sheet map of Europe, where *five* degrees on the side are equal in length to *six* degrees when measured upon a meridian line.

When the distance between any two places happens to exceed 90° on the globe, it may be found by measuring with the quadrant of altitude as before, the distance from the antipodes of one of the places to the other given place, and then subtracting the result from 180°.

PROBLEM XI.

Occasional Remark. When the distance between any two places is more than a quadrant or 90°, the bearing of one place from the other may be found by rectifying the globe for the antipodes of one of the given places, and then laying the quadrant of altitude over the other place, it will shew on the horizon the bearing of that place from the former, calling the *west* point of the horizon, *east*; and the *east*, *west*.

Some account of Europe, to be read with a coloured map of that Quarter.

Our first great division of the earth, is into what are called the four Quarters of the world; *Europe* towards the north, *Asia* towards the east, *Africa* towards the south, and *America*, or the New World, lying considerably to the west. The first three Quarters are represented in the eastern hemisphere of a general map of the World; and America, consisting of two large continents joined together by the isthmus of Darien or Panama is contained in the western hemisphere.

EUROPE, which is the smallest Quarter of the globe, is bounded on the east by *Asia*; on the west, by the *Atlantic Ocean*; on the north, by the *Frozen Sea*; and on the south, by the *Mediterranean*. This *Sea* is a principal object; and, on various accounts, deserves attentive consideration. It washes the coast of *Spain*, of *France*, of *Italy*, and of *Turkey in Europe*. It contains the islands of *Iviça*, *Majorca*, *Minorca*, *Corsica*, *Sardinia*, *Sicily*, *Candia*, and *Cyprus*, besides the smaller islands of the Archipelago, and others in the Gulph of Venice, or the Adriatic Sea. The length of the Mediterranean, from the Straits of Gibraltar to the Levant, or eastern part of the Mediterranean, is about 2000 miles. It is a curious circumstance, that, notwithstanding the prodigious quantity of water that runs into the Mediterranean from nine large rivers, (the *Ebro*

in Spain, the *Rhone* in France, the *Tiber*, and the *Po*, in Italy, the *Danube* and the *Nieſter* in European Turkey, the *Nieper* in the ſouthern parts of Ruſſia, the *Don* between Europe and Aſia, and the *Nile* in Africa,) beſides ſeveral ſmall ones, the current of water from the Atlantic, through the Straits of Gibraltar, (where alone the Mediterranean communicates with the ocean) conſtantly ſets towards the Mediterranean. To account for this ſingular phenomenon, it has been ſuppoſed, and the hypotheſis is in part ſupported by experiment, that there are two different currents at the mouth of the Straits, and that as much water is carried out by the under current, as is brought in by the upper one.—There are no tides in the Mediterranean Sea.

Beſides the Mediterranean, there are, in the Map of Europe, two other inland ſeas, the *Baltic*, and the *Black Sea*. The firſt communicates with the German Ocean through the Categate, between Sweden and Denmark, and the other with the Mediterranean by the Archipelago. There are no tides in the Baltic Sea. In the Caſpian Sea alſo, between Perſia and Aſiatic Turkey there are no tides.

The breadth of Europe, from the North Cape to the ſouthern parts of Italy, is about 2200 miles. It is ſituated between the 36th and 72nd degree of north latitude, and between 10° of weſt, and 60° of eaſt longitude. On a coloured map you immediately perceive the ſize and ſituation of the ſeveral kingdoms in Europe. And firſt obſerve the prodigious extent of the *Ruſſian empire*, the remainder of which covers an equal proportion of Aſia. *France*, *Spain*, *Germany*, *(Poland,)* *Denmark* and *Norway*, *European Turkey*, the *Britiſh dominions*, *Italy* and its appendages, differ not very materially in dimenſions. The ſmaller kingdoms and ſtates are, *Holland* or the *Seven United Provinces*, with the *Netherlands*, *Switzerland*, *Portugal*, and *Pruſſia*; the king

of Prussia is besides elector of Brandenburg in Germany, where you will find his capital, *Berlin, latitude ? Longitude ?*

The principal rivers are, the *Wolga*, which rises in Muscovy, and flowing through Persia, Georgia, and Tartary, falls into the Caspian Sea at Astracan. The *Don*, whose source is not far from that of the Wolga, but which runs towards the sea of Asoph. The *Danube* and the *Rhine*, both of which have their rise in or very near Switzerland. The *Danube* takes an eastern course, and after passing through Germany, Hungary, and European Turkey, enters the Black Sea by several channels, called the Mouths of the Danube. The *Rhine* takes a contrary direction, runs through Germany, where it forms the lake of Constance, and empties itself into the German Ocean, by Holland. The rivers of less note are, the *Elbe*, which falls into the German Ocean, about 70 miles below Hamburgh, and is navigable for large ships farther from its mouth, than any other river in Europe. The *Tagus*, at Lisbon; the *Thames*, at London; and the *Rhone*, in France, which flows from the Alps through the lake of Geneva, and falls into the Gulph of Lyons near Marseilles.

PROBLEM XII.

Recapitulation of the subjects treated on in the preceding problems, illustrated by suitable examples.

92. *What was the first problem?*—93. *What is latitude?—Find the latitude of Moscow.*

94. *What was the second problem?*—95. *What is the sun's place called in the Ephemeris?—Find the sun's place for to-day at noon, by the calendar on the wooden horizon, and also in the Ephemeris for the present year.*

96. *What was the third problem?*—97. *What is declination?—Find the sun's declination for this day, by the globe, and also in the ephemeris.*

Occasional Remark. The sun's declination may be found in the ephemeris, on the left hand side, in

the third column after that which contains the holidays and remarkable days. The small letters n and s, in the same column, denote respectively *north* and *south* declination. In March, the sun's declinations changes from south to north, and in September, when he enters the sign Libra, from north to south.

98. *What was the fourth problem?—Rectify the globe for Moscow, for this day at 12 o'clock at noon—* 99. *When the globe is rectified, what is the altitude or elevation of the pole above the horizon?*—100. *What is the elevation of the equator?*

101. *What was the fifth problem?*—102. *What is longitude?—Find the longitude of Moscow.*

103. *What was the sixth?*—This problem, you may recollect, is the converse of the fifth and first; that is, what were required in those problems, are given in the present one.—*What is that place whose longitude is 6° west, and latitude 15½° south.*

104. *What was the seventh?*—It may be useful to observe, that the seventh problem consists of two parts, the one relative to latitude, and the other to longitude.—*What places have the same longitude, and consequently the same hours of the day, as the island of St. Helena, on the west side of Africa, belonging to the English East India Company?—What places have the same latitude as Moscow?*

105. *What was the eighth problem?*—This problem relates to latitude.

106. *What was the ninth problem?*—107. *Where is difference of latitude counted?*—108. *Where is difference of longitude counted?*—109. *When do you add the latitudes or longitudes together?*—110. *When do you subtract one latitude or longitude from the other?*—111. *How many degrees of longitude or motion answer to one hour of time?—Find the difference of latitude between Moscow and St. Helena.—Also between the northern and southern extremities of Africa.*

Find the difference of longitude, and the difference of time, between St. Helena and Moscow.—What is the difference of longitude between the two Capes, which form the eastern and western extremities of Africa?—Required the difference of longitude, and the difference of time, between Calcutta or Fort William, in the East Indies, and Kingston, Jamaica, in the West Indies.

112. *What was the tenth problem?—Find the distance in degrees, in nautical miles, and in English miles, between Moscow and St. Helena.*

Occasional Remark. Difference of latitude is the meridional distance between the parallels, and difference of longitude is the equatorial or longitudinal distance between the meridians, of any two places; but the distance from one place to another is measured on a great circle supposed to be drawn on the surface of the globe, and passing through the two given places. The quadrant of altitude, applied to any part of the surface of the globe, represents one fourth part of a great circle.

113. *What was the eleventh problem?—Find the bearing of St. Helena from Moscow.*

Occasional Remark. Bearing is a nautical term, and means the situation of one place from another, with regard to the points of the compass. The bearings of places on land, as in the practice of surveying, are usually determined by the magnetic needle.

114. *Which are the four cardinal points?*—115. *What are the names of the four collateral or middle points?*—116. *How many points are there in the whole circumference of the horizon?*

PROBLEM XIII.

European Geography, *concluded* from problem XI. The island of *Great Britain* lies between 50 and 60 degrees of north latitude, and is divided into *Scotland*, or North Britain; *England* and *Wales*, or South Britain.

Scotland is divided into North Scotland or the *Highlands*, containing 13 counties; and South

Scotland, or the *Lowlands*, containing 20, making in all 33 counties.

Wales, which is situated on the west side of England, contains twelve counties; six of which belong to *North Wales*, and six to *South Wales*. In general fertility and population, South Wales has the superiority. All the Welsh counties, except three, (Montgomery, Radnor, and Brecknock,) touch the sea in some part of their boundary.

South Britain, including England and Wales, lies between 50 and 56 degrees of north latitude, and between 2° east, and 6° west longitude. It is every where surrounded by the sea, except on that part where it joins to Scotland. Its general figure is triangular, with one point to the north, another to the east, and another to the west. Of its three sides, the western is the longest, and most irregular, being broken and intersected by various points of land and arms of the sea. If a straight line be drawn from the *Lands-end*, or western extremity of Cornwall, to *Berwick-upon-Tweed*, it will give for the western side, 425 statute miles. A line drawn from Berwick to the *South Foreland* in Kent, will give, for the eastern side, 345 miles; and the triangle completed, by a line from the South Foreland to the Lands-end, will give, for the southern side, 340 miles.

Since the Norman conquest, England has been divided into six circuits, each circuit containing a certain number of counties. Two judges are appointed to visit each circuit in the spring and autumn, for administering justice to the subjects who are at a distance from the metropolis.—The extra-circuit counties are Middlesex and Cheshire, the former being the seat of the supreme courts of justice, and the latter, a county palatine having its own judges.—The largest county is that of York, being double in size to any other in England: the county of Rutland is the least.

For a description of any particular county in South Britain, see Dr. Aikin's "England delineated."

The principal straits of Europe are, those of *Gibraltar*, between Spain and Africa; of *Dover*, between England and France; and the *Straits of Messina*, between Italy and Sicily, where the formerly celebrated rocks of Scylla and Charybdis are situated.

Between the Black Sea and the Archipelago, is the *Sea of Marmora*. It communicates with the Black Sea, on the north east, through the Straits of Constantinople, and with the Archipelago; on the south west, through the Hellespont or the Straits of the Dardanelles.

Chief cities and remarkable towns of Europe.

London, on the river Thames, a rich commercial city, the metropolis of the British dominions, *lat.* ? *long.* ?

Edinburgh, the capital of Scotland, *lat.* ? *long* ?

Dublin, the metropolis of Ireland, and the second city in the British dominions, *lat.* ? *long.* ?

Paris, on the river Seine, the metropolis of France, *lat.* ? *long.* ?

Madrid, the capital of Spain, about the centre of the kingdom, *lat.* ? *long.* ?

Lisbon, on the river Tagus, the capital of Portugal, *lat.* ? *long.* ? A most dreadful earthquake happened here, November 1, 1755, of which a very interesting account is given in Heron's 'Extracts of Natural History,' vol. 1, page 14.

Vienna, on the river Danube, a noble and strong city, the capital of the German empire, *lat.* ? *long.* ?

Amsterdam, at the bottom of the Zuyderzee, the capital of Holland; the chief of the VII United Pro-

vinces, eminent for its commerce, *lat.* ? *long* ?

Copenhagen, in the island of Zealand, the capital of Denmark, *lat.* ? *long.* ?

Petersburgh, at the eastern extremity of the Gulph of Finland, a large and flourishing city, the capital of the Russian empire. It was built by Peter the Great, Czar of Muscovy, in 1703. *Lat.* ? *long.* ?

Stockholm, nearly opposite to Petersburg, the metropolis of Sweden, *lat.* ? *long.* ?

Bergen, a large sea-port and commercial town, opposite to Stockholm, on the coast of Norway, *lat.* ? *long* ?

Rome, on the river Tiber, a large, magnificent city, the capital of the Pope's dominions, *lat.* ? *long* ?

Naples, below Rome, near Mount Vesuvius, esteemed one of the finest cities in the world, *lat.* ? *long* ?

Venice, built on 72 islands, at the bottom of the Adriatic Sea, *lat* ? *long* ?

Bern, somewhat east of Geneva, the capital of Switzerland, *lat.* ? *long.* ?

Presburg, east of Vienna, a large fortified city, the capital of Hungary, *lat.* ? *long* ?

Constantinople, on the European side of the entrance into the Black Sea, the capital of the Turkish empire, *lat.* ? *long.* ?

PROBLEM XIV.

Occasional Remark. Taking the whole year together, the days are nearly equal to the nights in total duration; for, on comparing the results in the 3d and 4th examples, it evidently appears, that, as much as the days in summer exceed 12 hours, just so much they fall short in winter, when the sun is in the opposite point of the ecliptic. Those places which are situated under the equator, have their days and nights, at all times of the year,

nearly equal to each other; and, it has been already remarked, that all other places, lying on either side of the equator, have their days as much longer than 12 hours in summer, as they fall short of that number in winter; so that, on the whole, the total quantity of light and darkness allotted in the course of the year, to every region of the earth, is nearly the same, though distributed at various times, and in different portions.—But, owing to the eccentricity of the earth's orbit, the sun continues longer in the northern half of the ecliptic, than in the southern half; therefore all places in the northern hemisphere have a greater number of days in the spring and summer quarters, exceeding 12 hours, than there are in the autumnal and winter quarters, less than 12 hours. And hence, in the northern hemisphere, there is, independently of the twilight, and of the horizontal refraction of the sun's rays*, more day than night, and *vice versa*, in the southern hemisphere, there is, on the whole, more night than day. At the north pole, the sun is continually above the horizon from the 20th of March to the 23d of September, or 187 days; and below the horizon, from the 23d of September to the 20th of March, or 178 days only. On the contrary, at the south pole, the sun is constantly below the horizon 187 days; and visible only 178 days.

The vicissitudes of the seasons, and the variation in the length of days and nights at different places of the earth, are occasioned by the inclination of the earth's axis to the plane of its orbit, and its annual revolution round the sun.—The diurnal revolution of the earth round its axis, produces, in most parts of the globe, day and night every twenty-four hours.

* The horizontal refraction of the sun is 33′, or something more than half a degree, which raises the sun so much higher, making the day a little longer, and the night a little shorter.—When the sun is *above* the horizon, the r fraction diminishes in quantity as the altitude increases.

At Archangel, on the 21st of June, (the 6th example in this problem,) though the sun is about four hours below the horizon of that place, yet there is no real night there, that is, no total darkness; because the sun's greatest depression below the horizon, *viz.* at midnight, is only 2°. Now it is well known that the twilight usually begins and ends, when the sun is about 18° below the horizon.

PROBLEM XV.

Occasional Remark. The refraction of the sun's rays is that which produces the *crepusculum*, or the morning and evening twilight. The sun's rays, falling upon the upper part of the atmosphere, are reflected back to our eyes, and form a faint light, which, in the morning, gradually augments as the sun approaches nearer to the horizon, till it becomes perfect day.—See Ferguson's Astronomy, 8vo. page 90. &c.

Some account of Asia, to be read with a coloured map of that Quarter.

ASIA is bounded on the north by the *Frozen Ocean*; on the east, by the *Eastern Ocean*; on the south, by the *Indian Sea*; and on the west, by *Europe*, the *Mediterranean*, and the *Red Sea*, being joined to Africa by that isthmus of Suez.

Here, as was before remarked, the *Russian Empire* covers the largest space. In this vast territory, there are few objects worth remembering, except *Kamtschatka*, which is mentioned by some of our northern navigators,—and that inhospitable region, called *Siberia*, to which Russian malefactors are banished. Kamtschatka lies between 50 and 60 degrees, the latitude of the island of Great Britain.

With *Tartary* we have no concern: with *Arabia* and *Persia*, almost as little. In *Asiatic Turkey*, which is at the western extremity of the map, you find *Smyrna*, a sea-port town of Natolia, *lat.* ? *long.* ? and *Aleppo*, the metropolis of Syria, *lat.* ?

long ? at the eaſt end of the Mediterranean. Theſe places are well known to Engliſh merchants trading to Turkey. You there alſo find *Jeruſalem*, a city of Paleſtine, *lat.* ? *long.* ? and other places mentioned in ſcripture.

Thence we proceed to *Hindoſtan*, commonly called the *Eaſt Indies*, and tracing the coaſt from *Surat*, a ſea-port town, on the weſt ſide; *lat.* ? *long.* ? to *Calcutta*, or *Fort William*, which contains an Engliſh factory, near the Mouths of the Ganges, at the eaſtern extremity, *lat.* ? *long.* ? you paſs in ſucceſſion, *Bombay*, an iſland on the weſt coaſt of the Peninſula, in the poſſeſſion of the Engliſh, *lat.* ? *long.* ? *Goa*, a ſtrong town belonging to the Portugueſe, *lat.* ? *long.* ? and thence along the coaſts of the Carnatic, Malabar, and Coromandel, till you come to Pondicherry, which lies about a degree ſouth from *Madras*, or *Fort St. George*, belonging to the Engliſh, *lat.* ? *long.* ?

Hence paſſing to the ſouth of the equator, we ſail between the iſlands of Sumatra and Java; leaving, on the right, the Dutch ſettlement of *Batavia*, *lat.* ? *long.* ? and proceed directly north to *Canton* in China, *lat.* ? *long.* ? and thence to *Nankin*, *lat.* ? *long.* ? and *Pekin*, at the northern extremity of China, *lat.* ? *long.* ? Pekin, or as the natives pronounce it, Pitchin, is the metropolis of the whole empire, and the winter reſidence of the emperor. The famous wall which ſeparates China from Tartary, is ſaid to have exiſted 2000 years, and extends, though not equally perfected throughout, in a courſe of fifteen hundred miles: an aſtoniſhing production of human labour and perſeverance!

PROBLEM XVI.

Aſiatic geography, *concluded* from the laſt problem.

The ſeveral cluſters of iſlands in this map are thoſe of *Japan*, of *Sunda*, the *Philippines*, the *Ladrones*, the *Moluccas*, or Spice Iſlands, and the *Maldives*. The iſles of Sunda, in the Indian Ocean, are very numerous; but the chief are *Borneo*, *Sumatra*, and *Java*. The iſland of Borneo is nearly of a circular form, and, except New Holland, is ſuppoſed to be the largeſt island in the world. The metropolis is *Borneo*, near a ſalt-water lake, at the north-weſt part of the iſland, *lat.* ? *long.* ?

That part of Hindoſtan with which we have any connexion, lies within the northern tropic; that is within 23° 28′ of the equator: conſequently the inhabitants, during their ſummer, have twice a vertical ſun, and the climate is of courſe exceſſively hot.

The principal rivers in Aſia are, the *Euphrates*, which flows near the city of Erzerum, (the capital of Turcomania, in Aſiatic Turkey,) and unites with the *Tigris*, then paſſing by the city of Baſſora, falls into the Perſian Gulph.—The *Indus* which falls into the Gulph of Scindy, below the city of Tatta; and the *Ganges*, which ſeparates India *within* from India *beyond* the Ganges, and, after receiving many other rivers, falls, by various ſtreams, into the Bay of Bengal.—The *Oby* flows from Tartary to the Northern Ocean, and in its courſe ſerves as one of the boundaries of Aſia.

The chief cities in Aſia, beſides thoſe which have been already mentioned, are, *Aſtracan* in Tartary, on the Caſpian Sea, *lat.* ? *long.* ? *Siam*, the capital of a large kingdom, and one of the fineſt cities in Aſia, *lat.* ? *long.* ? *Iſpahan*, or as it is pronounced, Spauhaun, the capital of Perſia, *lat.* ? *long.* ? and *Mecca*, in Arabia, the birthplace of Mahomet, *lat.* ? *long.* ?

PROBLEM XVII.

117. *What are climates?*

118. *How many climates are there between the equator and the polar circles?*

119. *How many climates are there within the polar circles?*

PROBLEM XVIII.

Some account of Africa, to be read with a coloured map of that Quarter.

AFRICA forms a very considerable part of the habitable globe. It has hitherto been so imperfectly explored, that our knowledge extends but to a small distance from the coasts in any part. This arises, in some measure, from the extreme danger of travelling in it, on account of the intolerable heat, vast barren sands, and the dreadful scarcity of water.

On the east it is bounded by the *Red Sea*, and the *Indian Ocean*; on the north, by the *Mediterranean* and *Levant Seas*; on the west, by the *Atlantic Ocean*; and on the south by the *Eastern Ocean*.—It extends from 37° of north, to 35° of south, latitude; and between 17° of west, and 52° of east, longitude. Its length, from *Cape Bona*, in the Mediterranean, to the *Cape of Good Hope*, is about 4300 miles; and its breadth, from *Cape de Verd* to *Cape Guardafui* in Abyssinia, at the entrance of the *Straits of Babelmandel*, is 3500 miles.—The equator runs nearly through the middle of Africa.

Before we enter upon a more minute discription of this map, it may be useful to remark, generally, that those places which are above the equator have north latitude; those below, south latitude: the places on the left side of the first meridian have west longitude; and the rest, east longitude.—That point of the Globe in which the equator is cut by the first meridian, has evidently neither latitude nor longitude; that is, its latitude is *nothing*, being neither above nor below the equator, and its longitude is also *nothing*, being situated under the meridian of London, from whence the longitude of places is usually reckoned by the British.

If now you begin at the north-weſt corner of the map, at the *Straits of Gibraltar*, *lat.* ? *long.* ? and follow the ſouth coaſt of the Mediterranean, you come firſt to *Algiers*, which ſtands on the ſea oppoſite Majorca, *lat.* ? *long.* ? then to *Tunis*, *lat.* ? *long.* ? and then to *Tripoli*, *lat.* ? *long.* ? the inhabitants of all which towns have been long notorious for their piracies. Theſe are the only places of any conſequence on the coaſt of Barbary.—Continuing your journey eaſtwards, you arrive at *Alexandria* in Egypt, near to the ſeventh and weſtern mouth of the Nile, built by Alexander the Great, *lat.* ? *long.* ? Before the diſcovery of a paſſage to the Eaſt Indies by the Cape of Good Hope, Alexandria had the moſt extenſive trade of any city in the world; for the productions of the eaſt were brought to this place by way of the Red Sea, and a journey by land from Suez, then afterwards diſtributed over all Europe. Paſſing the mouths of the Nile, you next come to *Grand Cairo*, the capital of Egypt, a large and populous, but unhealthy city, *lat.* ? *long.* ? thence, travelling with the celebrated Bruce, between the Nile and the Red Sea, you traverſe the kingdom of Nubia, and arrive at Abyſſinia. From thence, ſtill following the coaſt, you will not find a name that deſerves to be remembered, till you come to the *Cape of Good Hope*, the ſouthern extremity of this continent, *lat.* ? *long.* ? It is a Dutch ſettlement, (but lately captured by the Engliſh,) in the country of the Hottentots, the moſt ſtupid and uncivilized people in the world.

PROBLEM XIX.

African geography *concluded*.

Having now, according to the ſeaman's phraſe, *doubled the Cape*, a country, by the way, with which we became better acquainted, ſince the publicatio of ſome late travels into this part of the world, by

Sparman and others,—you proceed northwards till you come to the coaſt of Guinea; thence you paſs the mouths of the Senegal and the Gambia, (branches of the river Niger) on the Negro coaſt, leaving a little to the weſtward, the *Cape de Verd Iſlands*, about twenty in number; then the *Canaries* or *Fortunate Iſles*; and finally the *Madeiras*, a ſmall cluſter, about 100 miles north of the Canaries.—On the ſouth ſide of the equator, you obſerve two ſmall iſlands, at a conſiderable diſtance from the continent,—*St. Helena, lat.* ? *long.* ? and *Aſcenſion, lat.* ? *long.* ? both in the track of our Eaſt India ſhips.

It was at the Iſland of St. Helena that Dr. Halley, in the years 1676 and 1677, took a catalogue of the fixed ſtars which lie ſo near the ſouth pole, that they do not appear above our horizon. Theſe he afterwards formed into conſtellations, and to one of them in particular, gave the name of the Royal Oak, *(Robur Caroli)* in memory of that tree in which Charles II. had, a few years before, ſaved himſelf from his purſuers.—There is alſo on the eaſt ſide of Africa, towards Zanguebar, the iſland of *Madagaſcar*, which is more than twice as large as Great Britain, being 1000 miles in length, from north to ſouth, and generally between 200 and 300 miles broad. Eaſt of Madagaſcar, in the Indian Ocean, are Bourbon and Mauritius, iſles belonging to the French.

The moſt remarkable rivers in Africa are, the *Nile*, which overflows its banks periodically, in the months of July and Auguſt, fertilizing and enriching the country through which it paſſes. The *Sphinx*, compoſed of the body of a young woman, grafted on that of a lion, was an hieroglyphic or emblem, which taught the people of Egypt the period of the moſt important event of rhe whole year. It is under the ſigns of *Leo* and *Virgo*, that the river Nile annually ſwells and overflows its banks.

It discharges itself into the Levant Sea by seven different channels or mouths, after a prodigious course of 2400 miles from its source in Abyssinia, which, according to Mr. Bruce, is in latitude 10° 59' 25" north, and 36° 55' 30" east longitude from the meridian of Greenwich.—The Niger, a very rapid river, after a course of 2800 miles, from east to west, disembogues itself in the Atlantic or Western Ocean, principally at *Senegal, lat.* ? *long.* ? where the French have a fort at the mouth of the river of that name.

PROBLEM XX.

120. *How are the inhabitants of the different zones distinguished, with respect to the falling of their shadows at noon? and first, of the torrid zone?*

121. *What are the inhabitants of the temperate zones called?*

122. *What are the inhabitants of the frigid zones called?*

PROBLEM XXI.

123. *What is a right or direct sphere, that is, what position of the sphere is termed direct?*

Occasional Remark. This position of the sphere cannot be represented on the common artificial globes, by reason of the hour circle which prevents the north pole from being brought quite down to the horizon.—But this and the other positions of the sphere, may be correctly elucidated by means of diagrams on paper.

The inhabitants of a right sphere are those, who, living under the equator have no latitude; they have therefore no elevation of the pole; they see both poles of the world, and all the stars appear successively above their horizon. The sun always rises and sets perpendicular to the horizon, and their days and nights are of equal duration throughout the year.

124. *What is a parallel sphere?*

Occasional Remark. In this position of the sphere,

the equator coincides with the horizon, and is in fact the common horizon of the two poles. In the parallels of latitude or declination being parallel to the horizon, no stars ever rise or set, (though they culminate or pass the meridian every twenty-four hours,) but revolve in circles parallel to the horizon.—Those who live at the poles, have but one day and one night, each being half a year long.

125. *What is an oblique sphere?*

PROBLEM XXII.

126. *What inhabitants of the earth are called Antœci?*

Occasional Remark. Places under the equator have no Antœci.

127. *How do these places agree with, or differ from, each other, with respect to hours and seasons?*

128. *What inhabitants of the earth are called Periœci?*

Occasional Remark. The north and south poles have no Periœci.

129. *How do these places, the Periœci, agree with, or differ from, each other, with regard to hours and seasons?*

130. *What people are called Antipodes?*

Occasional Remark. The two poles are both the Antœci and Antipodes of one another. Every place has its Antipodes.

The word *An-ti-po-des* is pronounced in four syllables, with the accent on the second. If the singular of this word was commonly in use, like *Satellite*, then we ought to form the plural regularly, and pronounce it in *three* syllables only; but as it is generally used in the plural *, and is perfect Greek, we ought to pronounce it in four.

* Mr. Walker, Junr. in the delivery of his Astronomical Lectures, (a popular exhibition, the effect of which is much

131. *How do the Antipodes differ from each other, with respect to seasons and hours?*

PROBLEM XXIII.

Some account of America, to be read with a coloured map of that Quarter.

This map of the continent of AMERICA, and of the *West India Islands*, requires to be studied with some attention; particularly *North America*, by which is generally understood, that tract of country which lies between the northern extremity of *Hudson's Bay*, and the *Gulph of Mexico*. Between the latitude 55 and 50, you will find New North and South Wales and Labrador or New Britain. This is a very cold climate, though in the same latitude with the southern parts of our island. From 50 to 45, you have Canada, Nova Scotia, and Newfoundland. These are still very cold countries, though in the same latitude with France. Between 45 and 40 lies New England, and New York. Thence you proceed southward through New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, East Florida, and West Florida.—Westward of these, you observe Louisiana and the vast kingdom of Mexico, extending southward as far as Panama, within 7° of the equator. From *Panama, long.* ? down to *Cape Horn*, the south point of America, *lat.* ? *long.* ? you pass no places of note, except *Lima* the capital of Peru, *lat.* ? *long.* ? whence the Spaniards import gold, and what is intrinsically more valuable, the *Cortex Peruvianus*.—A little to the west, you leave the island of Juan Fernandez in the South Seas, *lat.* ? *long.* ? rendered famous by Anson's Voyage round the World, and having been the residence of Alexander Selkirk, a Scotch mari-

improved by a great variety of large and beautiful transparencies,) uses this word, without any authority I believe, in the singular, as well as the plural, number.

ner, who continued here four years alone, without any other means of ſupporting life, than by running down goats, and killing ſuch other animals as he could come at. He was at length delivered by an Engliſh veſſel, and returned home.—Selkirk was adviſed to get his ſtory put in writing, and publiſhed. Being illiterate himſelf, he told every thing he could remember to Daniel Defoe, a profeſſed author of conſiderable note; who, inſtead of doing juſtice to the poor man, is ſaid to have applied theſe materials to his own uſe, by making them the ground-work of *Robinſon Cruſoe*, one of the moſt intereſting narratives ever written; at leaſt in all that part which relates to the deſert iſland.

You now double Cape Horn, the ſouthern extremity of Terra del Fuego, and paſſing Falkland's Iſlands, proceed northwards along a deſert coaſt to *Buenos Ayres, lat.* ? *long.* ? one of the moſt conſiderable towns in the province of La Plata. You are now arrived at the Brazils, an extenſive country, the coaſt of which is in the poſſeſſion of the Portugueſe. The wood called Brazil, which is brought from this country, is of great uſe in dying, and Brazil chips are well known as the principal ingredient for making red ink.—Doubling *Cape St. Roque, lat.* ? *long* ? and paſſing the mouth of the vaſt river of the Amazons, you touch at the Dutch Settlement of Surinam, and thence proceed along the coaſt to Curaſſou, an iſland about 28 miles from the continent of Terra Firma, in poſſeſſion of the Dutch.—Hence we continue our coaſting voyage till we arrive at *Carthagena, lat.* ? *long.* ? and Porto Bello, a ſea-port town of the iſthmus of Panama, in North America. Paſſing Vera Cruz on the Gulph of Mexico, you leave the city of *Mexico* on the left, *lat.* ? *long.* ? and continue coaſting the Gulph of Mexico, till you come to *New Orleans* the capital of Louiſiana, near the mouths of the river Miſſiſſippi, in the Gulph of Florida.

PROBLEM XXIV.

American Geography, *concluded* from the last Problem.

Your next objects are the islands of Cuba, and St. Domingo or Hispaniola, as it is also called. Near the western extremity of Cuba, you find the *Havannah, lat.* ? *long.* ? South of Cuba lies Jamaica, which was discovered in 1494, by Columbus, in his second expedition to the New World. The capital of the island is St. Jago-de-la-Vega or Spanish Town, situated on the banks of a river, about six miles from the sea. It is the Residence of the Governor or Commander in Chief; and it is here that the legislature is convened, and the Supreme Court of Judicature held.—Port-Royal, once a place of the greatest wealth and importance in the West Indies, is now reduced to a few streets, and about two hundred houses.—Kingston, situated on the north side of a beautiful harbour, is a place of great trade and opulence, and was founded in 1693, when repeated desolations, by fire and earthquake, had driven the inhabitants from Port-Royal.

East of St. Domingo you fall in with a string of small islands, the chief of which are, Antigua, St. Christopher's or St. Kitt's, Dominica, St. Vincent, Granada, and a little to the eastward Barbadoes, belonging to the English. The islands of Guadaloupe, Martinique, St. Lucia, and Tobago, were, before the commencement of the present war, in possession of the French.

The whole continent of America extends from Cape Horn, *lat.* 55° 58′ S. *long.* 'from London 67° 26′ W. *long.* (*from Ferro* ? *from Philadelphia* ?) almost to the North Pole; and spreads between the 40th degree of east, and the 100th degree of west longitude, reckoning from the meridian of Philadelphia*.

*Morse, in his American Geography, draws the first meridian through Philadelphia, because, as he observes, of the

In the Pacific Ocean, between 15 and 20 degrees of ſouth latitude, are the Society Iſles, for the knowledge of which we are principally indebted to Captain Cook. Nearly in the centre of theſe, is the celebrated Otaheite, or King George's Iſland.

The *Pelew Iſlands* are ſituated in the weſtern part of the Pacific Ocean, between 130 and 136 degrees of eaſt longitude, and between 5 and 9 degrees of north latitude. There is reaſon to ſuppoſe, that, although known to the Spaniards by the appellation of Palos Iſlands, no European ever landed upon them before the crew of an Engliſh Eaſt India Packet, commanded by Captain Wilſon, was ſhipwrecked there in 1783. The kind and humane reception they met with from Abba Thulle, the king of ſome of thoſe iſlands, was very deſervedly commemorated by the Eaſt India Company on the monument erected to the memory of his ſon, the amiable and unfortunate Lee Boo!—a name at which an Engliſhman drops the mingled tear of gratitude and regret,—gratitude for the hoſpitality of the Father, and regret for the premature fate of the ſon.

ſize, the beauty, and the central ſituation of that city—The longitude of Philadelphia from London, is 75° 8′ weſt. Ferro lies 17° 35′ W. from London

FINIS.
